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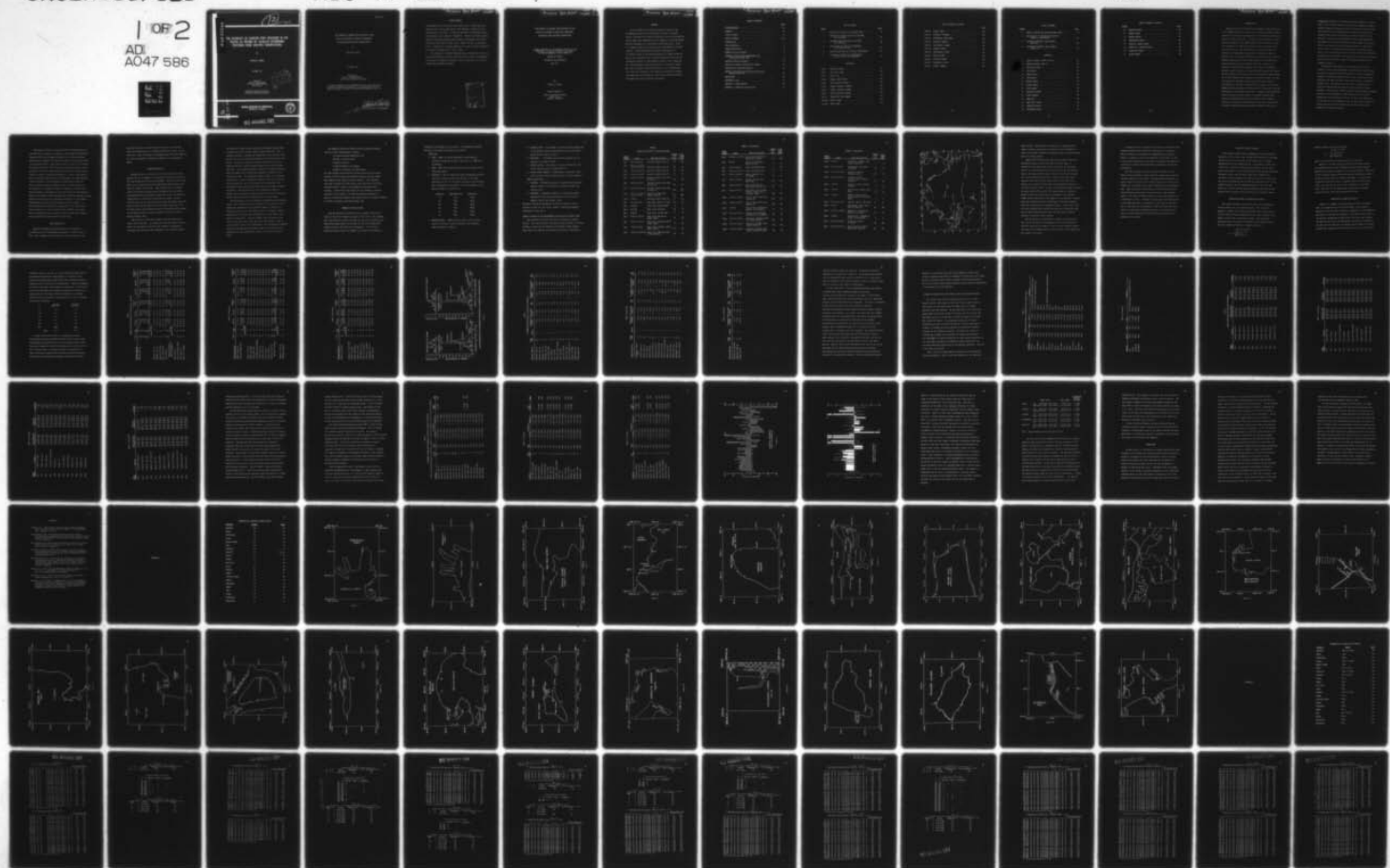
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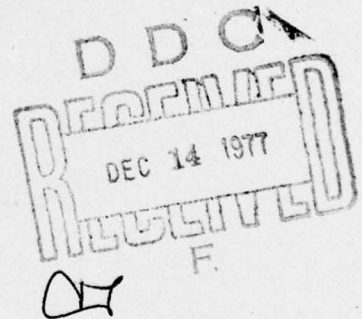
THE ACCURACY OF CHARTED PORT POSITIONS IN THE PACIFIC AS DEFINED BY SATELLITE DETERMINED POSITIONS USING MULTIPLE OBSERVATIONS

By

VALERIE M. HANNA

OCTOBER 1977

Prepared for
OFFICE OF NAVAL RESEARCH
under Contract N00014-75-C-0209,
Task 2-C (gravity)



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Valerie M. Hanna

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Office of Naval Research
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* A thesis submitted to the Graduate Division of the University of Hawaii in partial fulfillment of the requirements for the degree of Master of Science in Geology and Geophysics, May 1977.

Charles E. Helley

Director
Hawaii Institute of Geophysics

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THE ACCURACY OF CHARTED PORT POSITIONS IN THE
PACIFIC AS DEFINED BY SATELLITE DETERMINED
POSITIONS USING MULTIPLE OBSERVATIONS

A THESIS SUBMITTED TO THE GRADUATE DIVISION OF THE
UNIVERSITY OF HAWAII IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE
IN GEOLOGY AND GEOPHYSICS

MAY 1977

By

Valerie M. Hanna

Thesis Committee:

Simo H. Laurila, Chairman
John C. Rose
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ABSTRACT

As a by-product of the marine scientific program on the oceanographic cruises of the University of Hawaii's research vessels, positions for 34 dock or anchorage sites in and around the Pacific basin were determined using the Magnavox 702 CA (MX 702/hp) Satellite Navigator as a fixed point positioning device. While it is apparent that not all positions were determined to the same accuracy, a significant number represent improvements of 15 seconds or more in the charted positions of islands, ports and harbors in the Pacific basin. Thus this work may prove to be of considerable benefit by establishing a network of well known and well surveyed Doppler determined positions in the Pacific which may serve as geodetic position references. More fundamentally, this study will contribute to the safety of navigation in making land approaches by providing more modern and accurate positional information than can be obtained from charts.

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INTRODUCTION

The Navy Navigation Satellite System (NNSS), often referred to as the TRANSIT system, has been used as a primary navigation system aboard the oceanographic research vessels of the Hawaii Institute of Geophysics (HIG) since 1970. The first satellite navigation system used was a Magnavox 702 CA (MX/702/hp) Satellite Navigator, which was furnished HIG in 1969 by the Office of Naval Research of the United States Navy. The system first saw sea duty aboard the Institute's oceanographic research ship R/V Mahi from April to December 1970. In December 1970 when the R/V Mahi was retired, the system was transferred to the newly acquired R/V Kana Keoki and remained aboard that vessel through July 1976, when it was temporarily replaced with a Magnavox 702 system. The material reported in this thesis was all taken with the Magnavox 702 system and the study has its foundation in the test program conducted prior to the first voyage of the navigator aboard the R/V Mahi. In this test program the MX/702/hp system was used to make continuous observations at dock side in Honolulu over a period of 16 days and Daugherty (1974a) performed an analysis of the 79 satellite position determinations taken during this period. Daugherty determined that despite occasional erratic values, a remarkably precise mean position (standard deviation of 1.63 seconds of arc, standard deviation of the mean of 0.185 second of arc) could be determined by simple arithmetical averaging without editing of the data or

a posteriori updating of the satellite orbital parameters. On the basis of this initial testing of the satellite navigation system at Honolulu Daugherty proposed the idea of using the system as a point positioning device for various ports visited by the Institute's research vessels about the Pacific as a means to improve charted positions. That there is considerable need for such information was brought out in World War II when isolated islands in the South Pacific were reported as having charted positions as much as 20 miles in error. The results from an initial evaluation of data taken at nine port docking sites in the Pacific basin were presented by Daugherty at the December 1972 meeting of the American Geophysical Union and later published as Part I of Technical Report HIG-74-1 (Daugherty, 1974b).

The present study represents a continuation of the work referred to above, and incorporates an improvement in that the data are edited as suggested by Daugherty (1974b). Also the coverage is expanded to include 22 different ports. Some of these ports were occupied at the same locations several times and also at different docking sites. Also presented in this paper in Appendix A are charts for each docking site based on the latest and best maps available. The data were reduced using the same arithmetic averaging procedure used by Daugherty (1974a, 1974b) in order to permit comparisons with his unedited results. As some of the data used are the same as used by Daugherty there is some overlap between the results presented in this paper and the previous ones given by Daugherty and referred to above.

That there are other more precise methods of handling the data than arithmetic averaging is recognized. For example, Woollard and Thompson (1974) used a graphical approach for refining positions obtained with a Magnavox 706 satellite receiver system at land based sites in South America. Berg (1975, 1976) has shown that the double pass method of Anderle (1971) with antenna height corrections based on Stansell (1970) can yield highly refined positions (approximately 8 meters or better in position coordinates). However, the improvement in positions using these more sophisticated time consuming and expensive methods is not sufficient to significantly affect the basic conclusions reached regarding errors in charted positions. For example, if a comparison is made of coordinates for Pier 18 in Honolulu Harbor as determined in this study with those determined by Woollard and Thompson (1974) and Berg (1975, 1976) for the same site and using the same data sets, the greatest discrepancy is 0.07 seconds (approximately 2 meters), and on average only 0.05 seconds. As these differences are within the scaling error on the best charts, which seldom are on a scale of better than 1:10,000, it is clear that the considerable extra expense involved in these other methods was not justified for the purposes of this study.

DATA ACQUISITION

Satellite Navigation positioning data were collected at 22 different ports in the Pacific from October 5, 1970 to July 14, 1974. Due to changes in moored position and return visits to the

same port there are a total of 34 positions where the research vessel was either moored or at anchor and data were taken. In all there are a total of 45 data sets ranging in size from four fixes for one of the occupations at Guayaquil, Ecuador to 377 at Honolulu, Hawaii.

SYSTEM DESCRIPTION

During the time of collection of the data contained in this paper there were a maximum of six operational Doppler satellites in the Navy Navigation Satellite System (NNSS). Each satellite of the NNSS is in a circular polar orbit approximately 600 nautical miles above the surface of the earth. Each satellite makes a complete circle of the earth in approximately 105 minutes thus providing intermittent position fix updates rather than continuous navigation information as is provided by such systems as Omega. During a satellite pass the user receives line-of-sight UHF signals from each satellite both day and night and in all weather conditions. For the most accurate and consistent results the maximum elevation angle of the satellite above the horizon should lie between 15 and 75 degrees (Newton, 1967).

The satellites of the NNSS transmit two stable frequencies (about 150 and 400 MHz). By scaling and comparing Doppler frequency shifts of both signals, the first order effects of ionospheric refraction may be measured and eliminated in the computer program.

The satellite's memory system contains the navigation message which is transmitted on the 400 MHz signal in phase modulation. This navigation message is transmitted continuously and is timed to last exactly two minutes, beginning and ending at the instant of each even minute. The message readout is precisely controlled so that the beginning and end of each two minute message serves as an accurate time mark. The navigation message is based on a predicted ephemeris which is updated every 12 hours with parameters suitable for the following 16 hours. The broadcast message consists of a fixed part which defines a smooth, precessing elliptical orbit and a variable part consisting of a set of corrections to the elliptical orbit defining the predicted position of the satellite at eight two-minute time points. This variable part of the navigation message is changed every two minutes with the deletion of the oldest time point and the addition of orbital corrections at a new time point.

The ground based receiver records the transmitted fixed frequency signal. Due to the motion of the satellite in its orbit the fixed frequencies transmitted by each satellite appear to change as a function of time, this is the Doppler effect. The Doppler shift is proportional to the time rate of change of the slant range to the satellite (range rate). Given an assumed initial position of the receiver and a calculated range rate for a time instant t_i the so called frequency effect can be determined. The calculated and measured quantities are compared and residuals formed, the assumed initial quantities are then varied until a best fit is achieved (Newton, 1967).

The Magnavox 702/CA (Mx/702/hp) Satellite Navigation System consists of the following basic elements:

- a 43 pound antenna-preamplifier unit
- 200 feet of coaxial cable
- a Doppler receiver
- a Hewlett-Packard 2114 computer
- an ASR-33 teleprinter for input-output.

The input/output system aboard the R/V Kana Keoki allows dialogue between the HP 2114 Satellite Navigation computer and the central Data Logging system using a Nova mini-computer. Thus positions fixes may be merged with other data in near real time to allow the scientific party to monitor the geophysical environment while underway. A non-trivial side benefit of this computer to computer connection is the ability to reload the navigation program in a matter of seconds from magnetic tape rather than the 45 minutes required to reload the program using punched paper tape.

REMARKS ON DATA UTILIZED

Only the information contained in the standard satellite fix output of the HP 2114 computer was used in this study. Two programs were used during the period over which the data were accumulated, the MAPS-70065 program aboard the R/V Mahi in 1970 and the MAPS-70356 program aboard the R/V Kana Keoki subsequently. The satellite navigation program output was changed by deleting those parameters

relating to the movement of the receiver. The parameters retained and used in the present analysis are as follows:

INPUT DATA

1. DATE: (DATE) The Julian Day Number representing the consecutive numbering of days of the year, i.e. DATE 59 is 28 February.
2. TIME: (GMT) The Greenwich Mean Time of the position fix in hours and minutes.
3. SATELLITE: (SAT) Six near-polar orbit navigation satellites were used to measure these data samples. A two digit numbering code for the satellites, related to the semi-major axis in kilometers, was adopted. The correspondence to the Satellite Number is listed below:

SATELLITE	SEMI-MAJOR AXIS	SATELLITE #
42	7442	30120
54	7455	30140
63	7463	30180
64	7464	30130
65	7465	30190
67	7399	30200

4. ELEVATION ANGLE: (ELEV) Vertical angle of the satellite above the horizon at closest approach to the observing station measured in degrees.

5. ANTENNA HEIGHT: Geoid height, as taken from the geoidal map in the Magnavox manual, added algebraically to the ship's antenna height above sea level.
6. ITERATIONS: (IT) Number of iterations required for the program to converge on a fix.
7. DOPPLER COUNTS: (CTS) Number of counts received and used in the computation of the individual fix.
8. DOPPLER COUNT SEQUENCE: (CTSQ) Number of balanced (symmetric) 24 second counts about the point of closest approach.

DERIVED QUANTITIES:

1. LATITUDE: (LATITUDE) Latitude of observed points measured from the equator to the station in degrees, minutes and seconds of arc.
2. LONGITUDE: (LONGITUDE) Longitude of observation points measured from the Greenwich Meridian to the station in degrees, minutes and seconds of arc.

In Table 1 the dates, description of sites and number of fixes utilized at each site are listed. Figure 1 shows the geographic distribution of the sites.

SOURCES OF ERROR IN THE MEASUREMENTS AND SELECTION CRITERIA USED:

Each individual satellite fix may be influenced by several factors: the elevation angle, the antenna height assumed, the number of Doppler counts and the symmetry of the Doppler count sequence. These latter two indicate the quantity and quality of the Doppler

TABLE 1
DATES AND LOCATION OF SATELLITE FIXES

TABLE NUMBER	DATES	PORT AND LOCATION	NUMBER OF FIXES	# OF FIXES USED
1A-1	4-6 to 4-20-70	Honolulu, Hawaii Pier 18	87	66
1A-2	11-1 to 11-4-72 11-7 to 11-8-72	Honolulu, Hawaii Pier 18	68	44
1A-3	11-4 to 11-6-72	Honolulu, Hawaii Pier 18	37	29
1A-4	11-6 to 11-7-72	Honolulu, Hawaii Pier 10	8	5
1A-5	7-23 to 7-26-73	Honolulu, Hawaii Port side to Pier 18	36	30
1A-6	9-8 to 9-10-73	Honolulu, Hawaii Port side to Pier 18	45	31
1A-7	10-17 to 10-24-73	Honolulu, Hawaii Port side to Pier 18	139	102
1A-8	12-19 to 12-31-73 1-1 to 1-7-74	Honolulu, Hawaii Port side to Pier 18	377	252
1A-9	1-9-74	Honolulu, Hawaii Pier 40	17	11
2A-1	6-3 to 6-5-70	Pago Pago, Samoa, Oil Dock	25	21
3A-1	6-24-70	Suva, Fiji, King's Wharf	9	7
3A-2	6-25-70	Suva, Fiji, Dolphins	10	8
3A-3	6-26-70	Suva, Fiji, In Dry Dock	9	8
3A-4	7-20 to 7-21-71	Suva, Fiji, NW end of King's Wharf	19	10
3A-5	7-21 to 7-26-71	Suva, Fiji, Dolphins, NE of King's Wharf	77	56
3A-6	7-29 to 8-2-71	Suva, Fiji, Dolphins, NE of King's Wharf	117	81
3A-7	12-24 to 12-25-72	Suva, Fiji, 500 foot mark of King's Wharf	25	15

TABLE 1 (continued)

TABLE NUMBER	DATES	PORT AND LOCATION	NUMBER OF FIXES	# OF FIXES USED
3A-8	11-25 to 11-27-72	Suva, Fiji, Dolphins at Government Slipway	40	28
4A-1	8-4-70	Rabaul, New Britain, moored at dock	7	5
5A-1	9-18, 9-23-70	Guam, Dillingham Pier	7	13
5A-2	10-31 to 11-6-70	Guam, Dillingham Pier	21	6
6A-1	10-5 to 10-6-70	Majuro, Marshall Is., "T" Wharf	6	4
7A-1	5-26 to 5-29-71	Ponape, Caroline Is., Main Dock	40	24
8A-1	6-16 to 6-19-71	Palau, Caroline Is., Main Dock at Malakal Is.	56	37
9A-1	8-29 to 9-1-71	Wellington, New Zealand, Moored to East side of "Glasgow" Wharf	58	43
10A-1	1-15 to 1-22-72	Callao, Peru, Berth 9-D, (Callao A)	106	70
10A-2	2-23 to 2-27-72	Callao, Peru, Berth 4-A, (Callao B)	84	54
11A-1	2-29-72	Ancon, Peru, swinging at anchor, not dragging	11	8
12A-1	3-14 to 3-15-72	Talara, Peru, Swinging at anchor, not dragging	25	11
13A-1	4-13 to 4-20-72	Guayaquil, Ecuador, Berth #2, Puerto Maritimo	111	73
13A-2	2-15 to 2-19-73	Guayaquil, Ecuador, Port side to Berth #2	63	45
13A-3	2-19 to 2-20-73	Guayaquil, Ecuador, Port side to Caribbean Tiuna	22	12

TABLE 1 (continued)

TABLE NUMBER	DATES	PORT AND LOCATION	NUMBER OF FIXES	# OF FIXES USED
13A-4	3-6-73	Guayaquil, Ecuador, Port side to Berth #6	4	3
14A-1	5-1 to 5-2-72	Puntarenas, Costa Rica, at anchor	19	11
15A-1	5-11 to 5-12-72	Acapulco, Mexico, Moored at dock	20	12
15A-2	5-12 to 5-18-72	Acapulco, Mexico, 6 meters West of above position	47	26
15A-3	7-14-74	Acapulco, Mexico, Moored to Pier	6	5
16A-1	7-21-72	Sand Island, Midway, main pier	18	13
17A-1	1-21-73	Papeete, Tahiti, Port side to North end of main wharf	7	7
17A-2	5-31 to 6-1-73	Papeete, Tahiti, Fuel Dock	15	11
18A-1	4-3-73	Antofagasta, Chile, Port side to Sitio #2	52	36
19A-1	4-29 to 4-30-73	Easter Is., swinging at anchor in Cook Bay	14	12
20A-1	5-23-73	Pitcairn Is., swinging at anchor in Bounty Bay	6	6
21A-1	5-22 to 5-26-74	Valparaiso, Chile, Berth #4	38	25
22A-1	6-16 to 6-21-74	Balboa, Panama, Rodman Naval Base, Pier #2	82	55

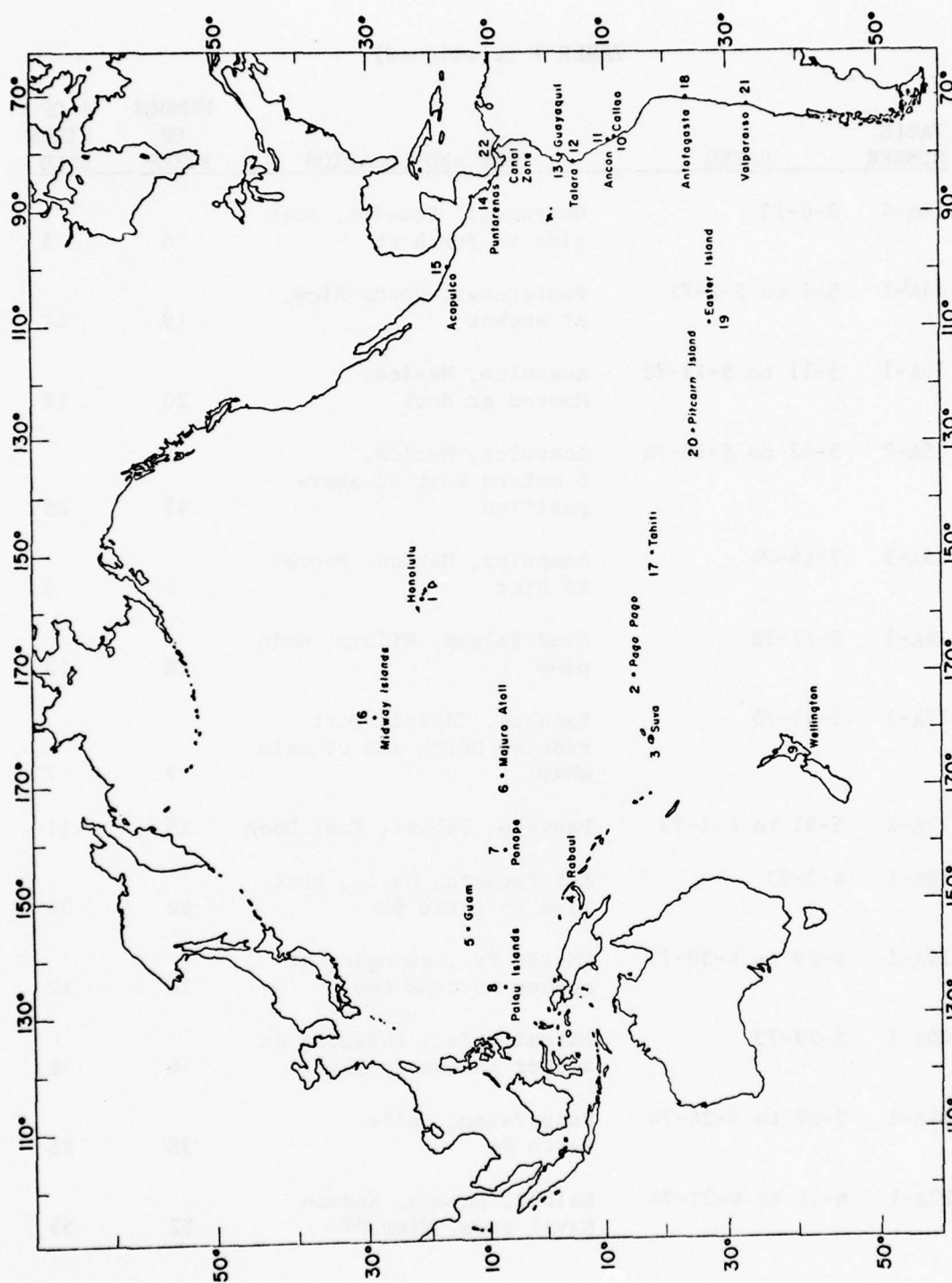


Figure 1. Chart of the Pacific showing harbor sites.

data received. The quantity of information is indicated by the number of Doppler counts while the quality of the information is shown by the number of balanced (symmetric) Doppler counts about the point of closest approach.

Newton (1967) indicated that the elevation angle affects the positional accuracy of satellite fixes in several ways. A significant cross-track effect may be created by the increasing effects of refraction which can be quite serious for low elevation passes. The high elevation passes, which do not suffer from data loss, have increasing sensitivity to errors in the cross-track direction since the elevation angle usually enters these error factors as the tangent of the angle, thus approaching infinity at an elevation angle of 90° . For this reason Newton advocates deleting all passes below 15° and above 75° elevation angles. Similarly Stansell (1970) has pointed out the importance of the antenna height used and the effect on the tangent of the satellite elevation angle and tropospheric effect particularly in defining longitude positions for East and West passing satellites. Berg (1975, 1976), even after applying these corrections found that certain data sets were of such variance from the rest, that the values should be rejected in deriving a final solution.

For the purposes of defining the arithmetic mean position of each site in the writer's investigation the following editing or rejection criteria were adopted. First, data for elevation angles less than 15° and greater than 75° were not used in the computations for reasons stated above.

A second rejection criterion was that there be no more than five program iterations (IT) required for convergence on a solution. This was chosen as a quick means of eliminating data lacking in quality or quantity or both from computation of the mean. As will be seen from an inspection of the tables in Appendix B the number of iterations is closely correlated with the information content and distribution.

The final automatic rejection criterion was based on first making a trial arithmetic solution and then inspecting all data for deviation against the trial mean. All passes having deviations of greater than 10 seconds of arc in either latitude or longitude were flagged and not included in the final computation of the arithmetic mean. Again inspection of the tables will show that passes with large deviations are generally those with low or high elevation angles, a low number of Doppler counts or a poor count sequence, or a combination of these. Although it can be argued that this is not a valid procedure since it represents in some cases an "overkill" and in other cases the incorporation of data that would have been rejected on the basis of probability theory, it does put all the data on a uniform numerical standard defined statistically for acceptance or rejection.

SATELLITE RESULTS OBTAINED

Even though excluded from the computation of the mean and the statistics of the position fix, the data eliminated in the described editing procedures are included in the tables but are flagged appropriately for easy identification. In Appendix B, tables 1A-1 to 22A-1, are listed the satellite fix information for the data used in this paper. In the following section the various statistical techniques used to test the data samples for reliability are discussed. Also in Appendix B are tables 1B-1 to 22B-1 which show the satellite determined mean latitude and longitude as well as the standard deviation and the standard deviation of the mean, and tables 1C-1 to 22C-1 showing similar information but with the data sorted to give a solution for each satellite by satellite number.

STATISTICAL TESTS OF RELIABILITY ADOPTED

The initial statistic that was calculated on all samples was the most obvious one, the arithmetic mean. This is shown in Appendix B, tables 1B-1 to 22B-1, where NP is the number of fixes, N is the number of fixes eliminated from the sample and NSD is the number of fixes used to calculate the mean. The statistical parameters used as a measure of precision of the positional data were the standard deviation of a single observation

$$s_x = \pm \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$$

and the standard deviation of the mean

$$s_{\bar{x}} = \pm \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n(n-1)}}$$

where n is the number of observations and \bar{x} is the mean.

Tables 1B-1 to 22B-1 also give the derived average latitude and longitude values and the standard deviation and the standard deviation of the mean in seconds of arc for each station. Tables 1C-1 to 22C-1 presents similar information with the data sorted to give a solution for each satellite by satellite number. As seen from an inspection of the above tables, recognized earlier by Berg (1975, 1976), all satellites are not of equal reliability at any given time. Satellite 54, for example, gave significantly different results from the other satellites much of the time.

DISCUSSION OF SATELLITE RESULTS

Table 2 is a summary of the data given in Tables 1B through 22B-1 in the appendix and site and the number of observations accepted in each case after editing for computation of the arithmetic mean values of latitude and longitude. Also shown in this table is the spread in maximum and minimum values of latitude and longitude recorded for each series of measurements, and where the ship was at the same site more than once, the weighted mean average of the mean latitude and longitude values are given for the site as well as the

arithmetic average. As seen, it is only at Honolulu that there is any significant difference (approximately 0.3 seconds of arc) between the weighted mean average values and a straight average of average values for each series of observations. That this weighting of values on the basis of the number of observations in each series may be less preferable than straight averaging of series values is evident from the following tabulation showing how the standard deviation varies with number of observations in a series. The data are for Pier 18 Honolulu.

N	Latitude Std. Dev.	Longitude Std. Dev.
27	1.3	1.4
29	1.3	1.3
31	1.2	1.4
44	1.4	1.9
101	1.5	1.9
252	<u>1.4</u>	<u>1.2</u>
Avg.	1.35	1.51

As seen from the above there is no apparent systematic relationship between the standard deviation values and the number of observations indicating that some factor having greater weight than size of sample is involved in determining the reliability of a fix. That the above is a general situation is brought out in Table 3 showing the spread between minimum and maximum deviations from the mean for latitude and longitude along with the average

TABLE 2

MAXIMUM AND MINIMUM VALUES FOR LATITUDE AND LONGITUDE

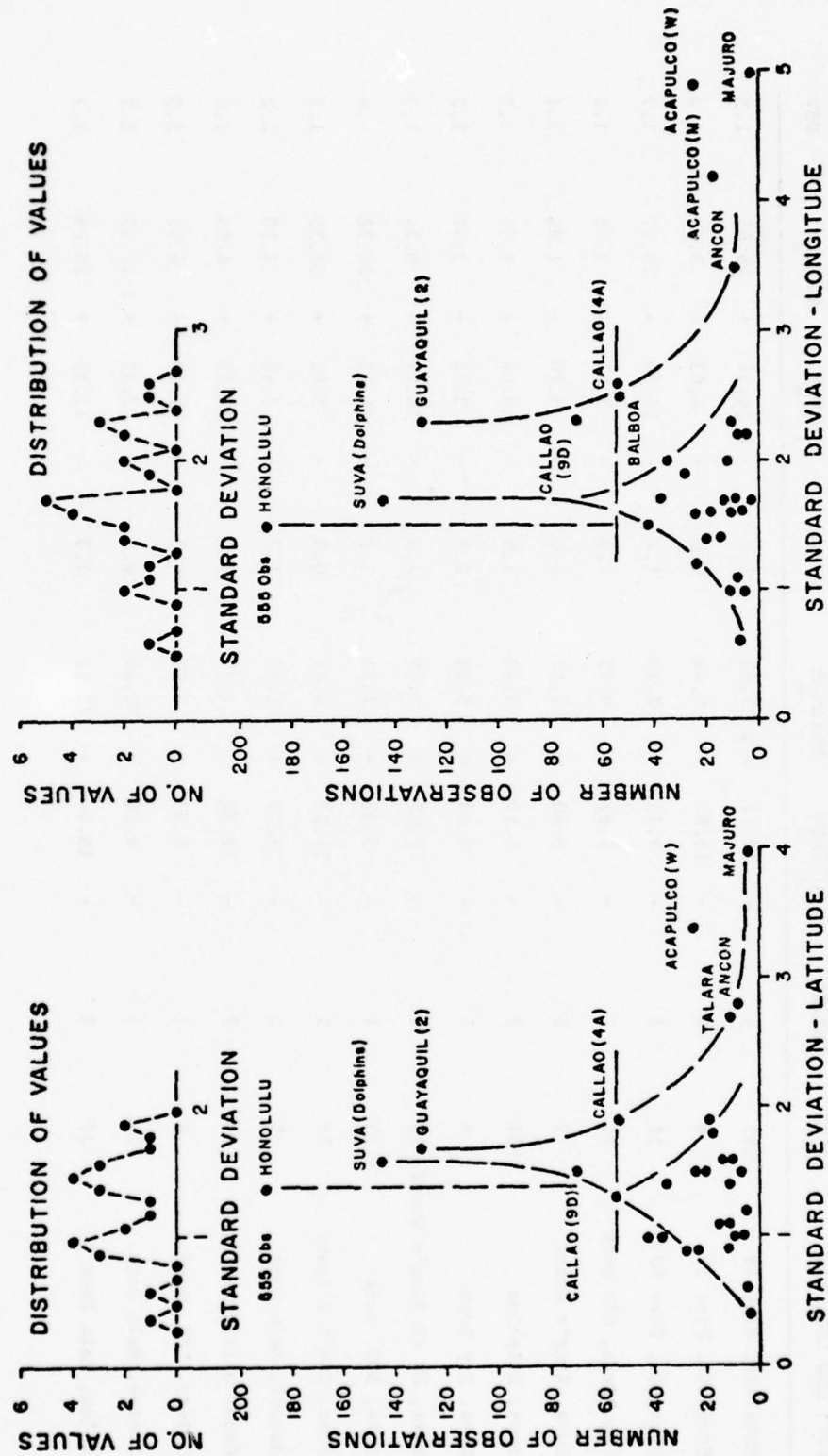
PORT AND LOCATION				# Obs	# Obs Used	Arithmetic			Arithmetic					
				Maximum	Minimum	O	"	Mean	Maximum	Minimum	O	"		
Honolulu, Pier 18				86	66	21	18 44.22	19 00.84	18 48.21	157	45 39.66	52	05.34	
				68	44		42.30	18 55.22	48.42	51	59.76	04.26		01.30
				37	29		32.28	53.10	49.92		55.14	07.14		00.90
				36	30		46.28	53.16	48.34		58.56	07.20		01.48
				45	31		33.24	19 09.12	48.70		52.26	11.94		01.70
				139	102		24.72	33 06.96	48.17		48 04.32	53 31.38		01.56
				377	252		17 54.60	23 38.16	48.19		51 42.18	55 22.92		01.48
Average:				18 30.81	21 10.08	18 48.56	50 27.41	52 47.17	52 01.56					
Weighted Mean:						18 48.28			52 01.52					
Honolulu, Pier 10				8	5	21	18 13.98	18 28.26	18 27.82	157	51 54.36	52	02.82	
Honolulu, Pier 40				17	11	21	18 56.58	19 06.60	19 04.31	157	52 37.20	53	34.02	
Pago Pago, Oil Dock				25	21	14	16 32.10	16 44.34	16 34.91	170	40 51.78	40	58.38	
Suva, King's Wharf				9	7	18	07 41.76	07 48.48	07 47.36	178	25 30.90	25	35.94	
Suva, Dolphins				10	8	18	07 46.20*	07 51.42*	07 49.00*	178	25 35.10*	25	42.36*	
				77	56		44.46	54.72	46.79		24.96	36.18		32.27
				114	81		40.62	08 13.68	46.76		24 01.14	45.30		32.20
				Average:		07 42.59	08 04.25	07 46.77	24 42.55	25 40.74	25 32.24			
*Values with wrong antenna height. Not used in averages.				Weighted Mean:				07 46.76			25 32.23			
Suva, Dry Dock				9	8	18	07 45.98	07 54.90	07 49.60	178	25 34.08	25	40.92	
Suva, NW of King's Wharf				19	10	18	07 41.22	08 06.36	07 56.27	178	25 12.66	25	36.42	
Suva, 500' mark				25	15	18	07 54.60	08 01.62	07 59.91	178	25 00.90	25	48.06	
Suva, Gov't Slipway				40	28	18	07 25.38	07 51.06	07 46.65	178	25 26.64	26	12.00	
												25	25.28	
													25 32.45	

TABLE 2 (continued)

PORT AND LOCATION	#Obs	# Obs Used	Arithmetic			Arithmetic			Arithmetic		
			O	Minimum	Maximum	Mean	O	Minimum	Maximum	Mean	
Rabaul, Main Dock	7	5	4	11 58.14	12 03.24	12 01.43	152	10 14.52	10 20.16	10 17.98	
Guam, Dillingham Pier	21	13	13	27 19.62	27 56.10	27 42.63	144	39 08.76	39 59.52	39 52.61	
	7	6		27 39.96	27 44.46	42.20		51.78	55.62	53.22	
		Average:		27 29.79	27 50.28	27 42.42		39 30.27	39 57.57	39 52.92	
		Weighted Mean:				27 42.49				39 52.80	
Majuro, "T" Wharf	6	4	7	06 13.02	06 25.20	06 18.99	171	22 09.18	22 23.16	22 16.59	
Ponape, Main Dock	39	24	6	58 40.02	59 15.18	58 44.74	158	11 54.66	13 19.14	12 01.97	
Palau, Main Dock	55	37	7	19 34.20	20 12.96	19 49.34	134	27 05.94	27 51.78	27 23.49	
Wellington, Glasgow Wharf	58	43	41	16 35.10	18 03.60	16 54.19	174	45 37.44	47 23.34	46 57.55	
Callao, Berth 9-D	104	70	12	02 55.86	03 33.18	03 19.62	77	07 00.30	09 30.72	08 58.97	
Callao, Berth 4-A	84	54	12	01 40.80	08 05.88	02 50.43	77	08 12.24	15 22.68	08 44.97	
Ancon, Anchored	11	8	11	44 25.62	45 14.76	44 31.51	77	10 17.40	19 35.46	10 24.73	
Talara, Anchored	25	11	04	33 30.96	34 03.78	33 44.51	81	17 14.76	17 34.26	17 20.44	
Guayaquil, Berth #2	110	73	2	16 43.98	20 12.18	16 59.84	79	51 43.02	54 38.10	54 20.35	
	64	45		16 47.28	25.32	59.76		53.16	38.10	20.46	
	22	12		37.50*	17 17.76*	58.11*		54 09.48*	33.18*	23.65*	
*Omitted in averages.		Average:		16 45.63	19 18.75	16 59.80		52 48.09	54 38.10	54 20.41	
		Weighted Mean				16 59.81				54 20.39	
Guayaquil, Berth #6	4	3	2	16 43.62	16 46.38	16 43.86	79	54 43.44	54 46.50	54 44.60	
Puntarenas, Anchored	19	11	9	57 47.40	57 54.90	57 51.33	84	49 19.32	49 29.28	49 26.30	

TABLE 2 (continued)

PORT AND LOCATION	# Obs	# Obs Used	O	Minimum	Maximum	Arithmetic		O	Minimum	Maximum	Arithmetic	
						Mean	"				Mean	"
Acapulco, Main Dock	20	12	16	50 41.76	51 05.76	50 53.76		99	54 04.74	54 39.84	54 15.86	
	6	5		30.78	50 54.66	53.84			51 11.88	20.22	17.23	
	Average:			50 36.27	51 00.21	50 53.80			52 38.31	54 30.03	54 16.55	
	Weighted Mean:					50 53.78					54 16.47	
Acapulco, W of Main Dock	47	26	16	50 44.28	51 15.48	50 54.65		99	53 19.38	59 11.76	54 19.16	
Midway, Main Pier	18	13	28	12 47.52	13 01.98	12 50.37		177	21 43.08	21 53.76	21 48.40	
Papeete, Main Wharf	7	7	17	31 59.58	32 03.90	32 01.50		149	34 20.70	34 22.74	34 21.80	
Papeete, Fuel Dock	15	11	17	31 57.30	32 20.16	32 14.22		149	34 09.06	35 30.66	34 10.69	
Antofagasta, Sitio #2	52	36	23	39 09.96	39 42.12	39 13.70		70	24 00.78	24 35.64	24 20.40	
Easter Is., Anchored	14	12	27	08 20.70	08 33.18	08 30.42		109	26 16.26	26 28.86	26 18.43	
Pitcairn Is., Anchored	6	6	25	03 51.24	03 53.88	03 52.02		130	05 33.72	05 38.58	05 36.17	
Valparaiso, Berth #4	38	25	33	01 45.12	02 07.32	02 00.48		71	37 30.24	38 37.68	37 36.72	
Balboa, Pier #2	81	55	8	52 04.80	57 17.10	57 06.86		79	30 22.02	35 06.90	34 22.90	



RELATIONSHIP OF STANDARD DEVIATION TO NUMBER OF OBSERVATIONS

Figure 2

TABLE 3
DIFFERENCE FROM THE MEAN IN LATITUDE AND LONGITUDE

PORT AND LOCATION	# OBS USED	SERIES	DIFFERENCE FROM THE MEAN		STD DEV	DIFFERENCE FROM THE MEAN		STD DEV
			MINIMUM	MAXIMUM		MINIMUM	MAXIMUM	
Honolulu, Pier 18	555	6	- 17.47	+ 2 21.80	1.4	- 1 34.11	+ 45.65	1.5
Honolulu, Pier 10	5	1	- 13.84	+ 0.44	0.6	- 4.63	+ 3.83	1.0
Honolulu, Pier 40	11	1	- 7.73	+ 2.29	1.4	- 16.89	+ 20.07	1.7
Pago Pago, Oil Dock	21	1	- 2.81	+ 9.43	1.5	- 3.54	+ 3.06	1.4
Suva, King's Wharf	7	1	- 5.60	+ 1.12	1.0	- 3.20	+ 1.84	1.1
Suva, Dolphins	137	2	- 4.17	+ 17.49	1.6	- 49.68	+ 8.51	1.7
Suva, Dry Dock	8	1	- 3.62	+ 5.30	2.8	- 3.32	+ 3.52	2.2
Suva, NW of King's Wharf	10	1	- 15.05	+ 10.09	1.0	- 14.02	+ 9.74	1.7
Suva, 500' mark	15	1	- 5.31	+ 1.71	1.1	- 24.38	+ 22.78	1.4
Suva, Gov't Slipway	28	1	- 21.27	+ 4.41	0.9	- 5.81	+ 39.55	1.9
Rabaul, Main Dock	5	1	- 3.29	+ 1.81	1.2	- 3.46	+ 2.18	2.2
Guam, Dillingham Pier	19	2	- 12.70	+ 7.79	1.9	- 22.65	+ 4.65	1.6
Majuro, "T" Wharf	4	1	- 5.97	+ 6.21	4.0	- 7.33	+ 6.65	5.0
Ponape, Main Dock	24	1	- 4.72	+ 30.44	0.9	- 7.31	+ 1 17.17	1.2
Palau, Main Dock	37	1	- 15.14	+ 23.62	1.0	- 17.55	+ 28.29	1.7

TABLE 3 (continued)

PORT AND LOCATION	# OBS USED	SERIES	DIFFERENCE FROM THE MEAN		STD DEV	DIFFERENCE FROM THE MEAN		STD DEV
			MINIMUM	MAXIMUM		MINIMUM	MAXIMUM	
Wellington, Glasgow Wharf	43	1	- 19.09	+ 1 09.41	1.0	- 1 20.11	+ 25.79	1.5
Callao, Berth 9-D	70	1	- 23.76	+ 13.56	1.5	- 1 58.67	+ 31.75	2.3
Callao, Berth 4-A	54	1	- 1 09.63	+ 5 15.45	1.9	- 32.73	+ 37.71	2.5
Ancon, Anchores	8	1	- 5.89	+ 43.25	2.8	- 7.33	+ 9 10.73	3.5
Talara, Anchored	11	1	- 13.55	+ 19.27	2.7	- 5.68	+ 13.82	2.3
Guayaquil, Berth #2	130	2	- 16.32	+ 2 19.18	1.7	- 1 46.27	+ 14.97	2.3
Guayaquil, Berth #6	3	1	- 0.24	+ 2.52	0.4	- 1.16	+ 1.90	1.7
Puntarenas, Anchored	11	1	- 3.93	+ 3.57	1.1	- 6.98	+ 2.98	1.6
Acapulco, Main Dock	17	2	- 17.53	+ 6.41	1.8	- 1 38.24	+ 13.48	4.2
Acapulco, W of Main Dock	26	1	- 10.37	+ 20.83	3.4	- 59.78	+ 4 52.60	4.9
Midway, Main Pier	13	1	- 2.85	+ 11.61	1.6	- 5.32	+ 5.36	2.0
Papeete, Main Wharf	7	1	- 1.92	+ 2.40	1.5	- 1.10	+ 0.94	0.6
Papeete, Fuel Dock	11	1	- 16.92	+ 5.94	0.9	- 1.63	+ 1 29.97	1.0
Antofagasta, Sitio #2	36	1	- 3.74	+ 28.42	1.4	- 19.62	+ 15.24	2.0
Easter Is., Anchored	12	1	- 9.72	+ 2.76	1.6	- 2.17	+ 10.43	1.7

TABLE 3 (continued)

PORT AND LOCATION	# OBS USED	SERIES	DIFFERENCE FROM THE MEAN		STD DEV	DIFFERENCE FROM THE MEAN		STD DEV	
			MINIMUM	MAXIMUM		MINIMUM	MAXIMUM		
Pitcairn Is., Anchored	6	1	-	0.78 +	1.86	-	2.45 +	2.41	1.6
Valparaiso, Berth #4	25	1	-	15.36 +	6.84	-	6.48 +	1 00.96	1.6
Balboa, Pier #2	55	1	-	4 49.76 +	10.24	-	4 00.88 +	44.00	1.6

standard deviation values for each site. A possible statistical explanation is brought out in Figure 2. In the figure the distribution of standard deviation values is plotted to see if they have a normal distribution, and a plot presented to show on an overall basis they are related to the number of observations.

As seen from Figure 2, (1) the standard deviation value defines a bimodal rather than a Gaussian (normal) distribution; (2) they are only partially related to the number of observations taken, and (3) certain sites are consistently subject to significant probable error in both latitude and longitude. This last is indicated by the values for these sites lying outside the envelope defining a convergence in values towards the most probable standard deviation to be expected. It is also to be noted that the standard deviation values are not significantly improved by taking more than 55 observations at a given site, and because of the bimodal distribution in values found, one should not expect better, on the average, than a standard deviation of 1.3 seconds of arc for latitude and 1.7 seconds of arc for longitude. The values which fall outside the envelope enclosing most of the data points at first glance appear to be a function of geographic location, and for the most part are restricted to the West Coast of Central and South America. However, this is not consistently true, and it can only be concluded that the large standard deviations noted for these observations as well as the bimodal distribution pattern shown are functions of the satellites involved. The most probable explanation

appears to be that there are errors in the ephemeris values, since the data considered were edited to eliminate all values apt to be suspect because of elevation angle values, or number of iterations needed, as well as those values whose standard deviation values departed significantly (>10 seconds of arc) from the mean.

RESULTS ON CHARTED POSITIONS VERSUS SATELLITE DEFINED POSITIONS

All of the charts used for defining position were the most recent available, and except for the one for Ancon, Peru issued in 1923 and the one for Rabaul issued in 1966, all of the charts represent post 1972 editions. As seen from Table 4, the scales for these charts varies from 1:5,000 to 1:36,481, and for the most part they have a scale of 1:10,000 and 1:12,500 (11 charts) or 1:25,000 and 1:35,000 (8 charts). If an average reliability of 1 mm is assumed for the ship's plotted positions at a dock or anchorage, on a chart of 1:10,000 scale there would be an uncertainty of about 10 meters or 0.3 seconds in position. For charts on a scale of 1:25,000 and 1:35,000, the uncertainty is proportionally greater. The uncertainty in scaling coordinates for these charted positions, on the other hand, is based on the spread in values obtained for the positions which were scaled twice by two different observers. This was of the order of ± 0.2 mm.

Table 5 lists the chart-measured coordinates and the satellite-derived coordinates. Table 6 lists the comparison of the chart-and

TABLE 4
CHARTS USED FOR POSITION COMPARISONS WITH SATELLITE DATA

LOCATION	CHART #	YEAR	SCALE	AUTHORITY
Acapulco	21401	1974	1:25,000	Defense Mapping Agency, Hydrographic Center
Ancon	22171	1923	1:36,481	United States Navy, Hydrographic Office
Antofagasta	22221	1976	1:12,500	DMA-HC
Callao	22172	1972	1:10,000	DMA-HC
Easter Is	22451	1975	1:23,173	USN-HO
Guam	81048	1975	1:10,000	National Oceanic and Atmospheric Administration
Guayaquil	22113	1973	1:10,000	DMA-HC
Honolulu	19367	1974	1:5,000	NOAA
Majuro	81782	1974	1:35,000	DMA-HC
Midway	19481	1973	1:32,500	NOAA
Pago Pago	83484	1975	1:15,000	NOAA
Palau	81155	1972	1:10,000	DMA-HC
Papeete	83385	1975	1:6,000	DMA-HC
Panama	21604	1976	1:12,500	DMA-HC
Pitcairn Is	83225	1972	1:24,079	DMA-HC
Ponape	81435	1975	1:36,115	DMA-HC
Puntarenas	21546	1976	1:12,500	DMA-HC
Rabaul	82192	1966	1:25,000	USN-HO

TABLE 4 (continued)

LOCATION	CHART #	YEAR	SCALE	AUTHORITY
Suva	83605	1975	1:12,150	Defense Mapping Agency, Hydrographic Center
Talara	22121	1976	1:10,000	DMA-HC
Valparaiso	22259	1976	1:8,000	DMA-HC
Wellington	76071	1975	1:12,000	DMA-HC

TABLE 5
CHART EVALUATIONS AND SATELLITE COORDINATES

TABLE NUMBER	LOCATION	CHART EVALUATION OF DOCKING SITE	SATELLITE COORDINATES	DIFFERENCE
1A-1	Honolulu, Pier 18	21° 19' 00" 157° 52' 10.6"	21° 18' 48.2" N 157° 52' 01.53" W	+ 11.8 + 9.1
1A-2	Honolulu, Pier 18	21° 19' 00" 157° 52' 10.6"	21° 18' 48.41" N 157° 52' 01.30" W	+ 11.6 + 9.3
1A-3	Honolulu, Pier 18	21° 19' 00" 157° 52' 10.5"	21° 18' 49.92" N 157° 52' 00.90" W	+ 11.1 + 9.6
1A-4	Honolulu, Pier 10	21° 18' 38.5" 157° 52' 08.8"	21° 18' 27.81" N 157° 51' 58.99" W	+ 10.7 + 9.8
1A-5	Honolulu, Pier 18	21° 19' 00" 157° 52' 10.6"	21° 18' 48.34" N 157° 52' 01.48" W	+ 11.7 + 9.1
1A-6	Honolulu, Pier 18	21° 19' 00" 157° 52' 10.6"	21° 18' 48.70" N 157° 52' 01.70" W	+ 11.3 + 8.9
1A-7	Honolulu, Pier 18	21° 19' 00" 157° 52' 10.6"	21° 18' 48.48" N 157° 52' 01.14" W	+ 11.5 + 9.5
1A-8	Honolulu, Pier 18	21° 19' 00" 157° 52' 10.6"	21° 18' 48.19" N 157° 52' 01.47" W	+ 11.8 + 9.1
1A-9	Honolulu, Pier 40	21° 19' 14.3" 157° 53' 03.3"	21° 19' 04.31" N 157° 52' 54.09" W	+ 10.0 + 9.2
2A-1	Pago Pago, Oil Dock	14° 16' 45.0" 170° 41' 09.5"	14° 16' 34.91" S 170° 40' 55.32" W	+ 10.1 + 14.2

TABLE 5 (continued)

TABLE NUMBER	LOCATION	CHART EVALUATION OF DOCKING SITE	SATELLITE COORDINATES	DIFFERENCE
3A-1	Suva, King's Wharf	18° 08' 00.5" 178° 25' 42.5"	18° 07' 47.36" S 178° 25' 34.10" E	+ 13.1 + 8.4
3A-2	Suva, Dolphins	18° 07' 53.5" 178° 25' 45.0"	18° 07' 49.00" S 178° 25' 37.55" E	+ 4.5 + 7.5
3A-3	Suva, Dry Dock	18° 07' 55.8" 178° 25' 47.0"	18° 07' 49.60" S 178° 25' 37.40" E	+ 6.2 + 9.6
3A-4	Suva, NW of Kings Wharf	18° 08' 00" 178° 25' 39.5"	18° 07' 56.27" S 178° 25' 26.68" E	+ 4.2 + 12.8
3A-5	Suva, Dolphins	18° 07' 53.5" 178° 25' 45.0"	18° 07' 46.79" S 178° 25' 32.27" E	+ 7.6 + 12.7
3A-6	Suva, Dolphins	18° 07' 53.5" 178° 25' 45.0"	18° 07' 46.74" S 178° 25' 32.20" E	+ 6.8 + 12.8
3A-7	Suva, 500' King's Wharf	18° 08' 05.0" 178° 25' 38.5"	18° 07' 59.91" S 178° 25' 25.28" E	+ 5.1 + 13.2
3A-8	Suva, Gov't Slipway	18° 07' 52.5" 178° 25' 46.4"	18° 07' 46.65" S 178° 25' 32.45" E	+ 5.6 + 13.9
4A-1	Rabaul, Main Dock	4° 12' 10.0" 152° 10' 08.0"	4° 12' 01.43" S 152° 10' 17.98" E	+ 8.6 - 10.0
5A-1	Guam, Dillingham Pier	13° 27' 35.3" 144° 39' 43.0"	13° 27' 42.20" N 144° 39' 53.22" E	- 6.7 - 10.2
5A-2	Guam, Dillingham Pier	13° 27' 35.5" 144° 39' 43.0"	13° 27' 42.63" N 144° 39' 52.61" E	- 7.1 - 9.6

TABLE 5 (continued)

TABLE NUMBER	LOCATION	CHART EVALUATION OF DOCKING SITE	SATELLITE COORDINATES	DIFFERENCE
6A-1	Majuro, "T" Wharf	7° 06' 24.0" 171° 22' 18.0"	7° 06' 18.99" N 171° 22' 16.59" E	+ 5.0 + 1.4
7A-1	Ponape, Main Dock	6° 59' 12.0" 158° 12' 59.0"	6° 58' 44.74" N 158° 12' 01.97" E	+ 27.3 + 57.0
8A-1	Palau, Main Dock	7° 19' 39.0" 134° 27' 50.0"	7° 19' 49.34" N 134° 27' 23.49" E	+ 10.3 + 26.5
9A-1	Wellington, Glasgow Dock	41° 17' 00.0" 174° 46' 58.0"	41° 16' 54.19" S 174° 46' 57.54" E	+ 5.8 + 0.5
10A-1	Callao, 9-D	12° 03' 29.0" 77° 09' 44.5"	12° 03' 19.62" S 77° 08' 58.97" W	+ 9.4 + 45.5
10A-2	Callao, 4-A	12° 03' 24.0" 77° 09' 38.0"	12° 02' 50.43" S 77° 08' 44.97" W	+ 33.6 + 53.0
11A-1	Ancon, Anchored	11° 44' 30.0" 77° 10' 30.0"	11° 44' 31.51" S 77° 10' 24.73" W	- 1.5 + 5.3
12A-1	Talara, Anchored	4° 34' 00.0" 81° 18' 00.0"	4° 33' 44.51" S 81° 17' 20.44" W	- 15.5 - 39.6
13A-1	Guayaquil, #2	2° 16' 47.0" 79° 54' 13.5"	2° 16' 59.84" S 79° 54' 20.35" W	- 12.8 - 6.9
13A-2	Guayaquil, #2	2° 16' 47.0" 79° 54' 13.5"	2° 16' 59.76" S 79° 54' 20.46" W	- 12.8 - 7.0
13A-3	Guayaquil, #2	2° 16' 47.0" 79° 54' 13.5"	2° 16' 58.11" S 79° 54' 23.65" W	- 11.1 - 10.2
13A-4	Guayaquil, #6	2° 16' 33.5" 79° 54' 33.5"	2° 16' 43.86" S 79° 54' 44.60" W	- 10.4 - 11.1

TABLE 5 (continued)

TABLE NUMBER	LOCATION	CHART EVALUATION OF DOCKING SITE	SATELLITE COORDINATES	DIFFERENCE
14A-1	Puntarenas, Anchored	9° 57' 54.0" 84° 49' 28.5"	9° 57' 51.33" 84° 49' 26.39"	+ 2.7 + 2.1
15A-1	Acapulco, Main Dock	16° 50' 47.0" 99° 54' 10.0"	16° 50' 53.76" N 99° 54' 15.86" N	- 6.8 - 5.9
15A-2	Acapulco, Main Dock	16° 50' 47.0" 99° 54' 12.0"	16° 50' 54.65" N 99° 54' 19.16" W	- 7.7 - 7.2
15A-3	Acapulco, W of Main Dock	16° 50' 47.0" 99° 54' 10.0"	16° 50' 53.84" N 99° 54' 17.23" W	- 6.8 - 7.2
16A-1	Midway, Main Pier	28° 12' 36.0" 177° 21' 46.0"	28° 12' 50.37" N 177° 21' 48.40" W	- 14.4 - 2.4
17A-1	Papeete, Main Wharf	17° 32' 19.5" 149° 34' 08.5"	17° 32' 01.50" S 49° 34' 21.80" W	+ 18.0 - 13.3
17A-2	Papeete, Fuel Dock	17° 32' 17.8" 149° 34' 08.3"	17° 32' 14.22" S 149° 34' 10.68" W	+ 3.6 - 2.4
18A-1	Antofagasta, Sitio #2	23° 39' 11.0" 70° 25' 19.0"	23° 39' 13.70" S 70° 24' 20.40" W	- 2.7 + 58.6
19A-1	Easter Island, Anchored	27° 08' 00.0" 109° 26' 30.0"	27° 08' 30.42" S 109° 26' 18.43" W	- 30.4 + 11.6
20A-1	Pitcairn Island, Anchored	25° 03' 41.0" 130° 05' 35.0"	25° 03' 52.02" S 130° 05' 36.17" W	- 11.0 - 1.2
21A-1	Valparaiso, Berth #4	33° 01' 55.0" 71° 37' 54.0"	33° 02' 00.48" S 71° 37' 36.72" W	- 5.5 + 17.3
22A-1	Balboa, Berth #2	8° 57' 12.0" 79° 34' 32.5"	8° 57' 06.86" N 79° 34' 22.90" W	+ 5.1 + 9.6

satellite defined positions. It will be noted that seven series of observations were taken over a four-year period for Pier 18 in Honolulu Harbor and that the latitude error indicated is $+ 11.54 \pm .21$ seconds and for longitude $+ 9.23 \pm .20$ seconds.

As Berg (1976) has reported what he regards as a "best" solution position for Pier 18 in Honolulu Harbor, it is of interest to compare this writer's coordinates for Pier 18 with those obtained by Berg using the double pass method and the additional rejection criteria he adopted in arriving at his "best" solution. In regard to this solution, Berg (1976), after using normal rejection criteria as to satellite elevation angles, iterations required, symmetry in Doppler counts and number of Doppler counts greater than 5, used the computed geoidal height from trial solutions as an additional criterion for rejection. Starting with what would normally be regarded as acceptable data for a double pass solution, Berg determined the geoidal height for each pair of consecutive passes of the same satellite. These pairs of values whose standard deviation in geoidal height exceeded 2σ from the mean were then rejected for determining position location. In his solution for the position of Pier 18, Honolulu his first trial solution using the double pass method gave the following coordinates: Lat $21^{\circ} 18.4042'$; Long $157^{\circ} 52.0146'$, antenna height 34.35 m. The second solution after rejecting one series of data whose antenna (geoidal) height exceeded the 2σ limit, gave the following results: Lat $21^{\circ} 18.8054'$; Long $157^{\circ} 52.0166'$,

antenna height 32.26 m. The third solution after rejecting another series of observations whose antenna height exceeded the 2σ limit for this set of data gave the following results: Lat $21^{\circ} 18.8062'$; Long $157^{\circ} 52.0151'$; antenna height 31.09 m. This sample of data was the one used to get a final 'best' position by repeating the process outlined above but with respect to the standard deviation for position coordinates not exceeding the 2σ rejection criterion. In this process four more series of double passes were eliminated.

The final position determined by Berg (1976) for Pier 18, his "best" solution, gives the following coordinates: Lat $21^{\circ} 18.8140$ ($18' 48.48''$); Long $157^{\circ} 52.0230'$ ($52' 01.38''$). The position derived by the writer is Lat $21^{\circ} 18' 48.56''$ (average) or $21^{\circ} 18' 48.28''$ (weighted mean) and Long $157^{\circ} 52' 01.56''$ (average) or $157^{\circ} 52' 01.52''$ (weighted mean). As seen the difference in latitude is between $0.08''$ and $0.20''$ (2.5 to 7.5 meters), and the difference in longitude is between $0.15''$ and $0.18''$ (4.3 to 4.5 meters). Although this degree of agreement is undoubtedly fortuitous, it does support the initial assumption made in this study, namely that the method of analysis adopted is adequate for evaluating the reliability of published chart positions.

From an inspection of Table 6 and Figures 3 and 4 which are graphical representations of the difference in chart position and satellite defined positions, it is seen that the apparent degree in error in chart position varies significantly and that there are errors in excess of 50 seconds in latitude and longitude for several

TABLE 6

DIFFERENCE BETWEEN CHART MEASURED AND SATELLITE DERIVED COORDINATES

+ values of latitude are north of satellite position, + values of longitude are west of satellite position.

LOCATION	# OBS USED	TABLE NO.	DIFFERENCE		CHART SCALE	YEAR
			LATITUDE	LONGITUDE		
Honolulu, Pier 18	66	1A-1	+ 11.8" (364m)	+ 9.1" (262m)	1:5,000	1974
Honolulu, Pier 18	44	1A-2	+ 11.6" (358m)	+ 9.3" (268m)		
Honolulu, Pier 18	29	1A-3	+ 11.1" (343m)	+ 9.6" (276m)		
Honolulu, Pier 18	30	1A-5	+ 11.7" (361m)	+ 9.1" (262m)		
Honolulu, Pier 18	31	1A-6	+ 11.3" (349m)	+ 8.9" (256m)		
Honolulu, Pier 18	102	1A-7	+ 11.5" (355m)	+ 9.5" (273m)		
Honolulu, Pier 18	252	1A-8	+ 11.8" (364m)	+ 9.1" (262m)		
Honolulu, Pier 10	5	1A-4	+ 10.7" (331m)	+ 9.8" (282m)		
Honolulu, Pier 40	11	1A-9	+ 10.0" (309m)	+ 9.2" (265m)		
Pago Pago, Oil Dock	21	2A-1	+ 10.1" (312m)	+ 14.2" (425m)	1:15,000	1973
Suva, King's Wharf	7	3A-1	+ 13.1" (405m)	+ 8.4" (247m)	1:12,150	1975
Suva, Dolphins	8	3A-2	+ 4.5" (139m)	+ 7.5" (220m)		
Suva, Dry Dock	8	3A-3	+ 6.2" (192m)	+ 9.6" (282m)		
Suva, NW King's Wharf	10	3A-4	+ 4.2" (130m)	+ 12.8" (376m)		
Suva, Dolphins	56	3A-5	+ 7.6" (235m)	+ 12.7" (373m)		
Suva, Dolphins	81	3A-6	+ 6.8" (210m)	+ 12.8" (376m)		

TABLE 6 (continued)

LOCATION	# OBS USED	TABLE NO.	DIFFERENCE		LONGITUDE	CHART SCALE	YEAR
			LATITUDE				
Suva, 500' King's Wharf	15	3A-7	+ 5.1" (158m)		+ 13.2" (387m)		
Suva, Gov't Slipway	28	3A-8	+ 5.6" (173m)		+ 13.9" (408m)		
Rabaul, Main Dock	5	4A-1	+ 8.6" (266m)		- 10.0" (308m)	1:25,000	1966
Guam, Dillingham Pier	13	5A-1	- 6.7" (207m)		- 10.2" (306m)	1:10,000	1975
Guam, Dillingham Pier	6	5A-2	- 7.1" (219m)		- 9.6" (288m)		
Majuro, "T" Wharf	4	6A-1	+ 5.0" (154m)		+ 1.4" (43m)	1:35,000	1974
Ponape, Main Dock	24	7A-1	+ 27.3" (843m)		+ 57.0" (1748m)	1:25,000	1973
Palau, Main Dock	37	8A-1	- 10.3" (318m)		+ 26.5" (812m)	1:10,000	1972
Wellington, Glasgow Wharf	43	9A-1	+ 5.8" (179m)		+ 0.5" (12m)	1:12,000	1975
Callao, 9-D	70	10A-1	+ 9.4" (290m)		+ 45.5" (1375m)	1:10,000	1972
Callao, 4-A	54	10A-2	+ 33.6" (1038m)		+ 53.0" (1601m)		
Ancon, Anchored	8	11A-1	- 1.5" (46m)		+ 5.3" (160m)	1:36,481	1923
Talara, Anchored	11	12A-1	- 15.5" (479m)		- 39.6" (1219m)	1:10,000	1976
Guayaquil, #2	73	13A-1	- 12.8" (395m)		- 6.9" (211m)	1:10,000	1973
Guayaquil, #2	45	13A-2	- 12.8" (395m)		- 7.0" (215m)		
Guayaquil, Tiuna	12	13A-3	- 11.1" (343m)		- 10.2" (313m)		
Guayaquil, #6	3	13A-4	- 10.4" (321m)		- 11.1" (340m)		

TABLE 6 (continued)

LOCATION	# USED	TABLE NO.	DIFFERENCE		LONGITUDE	CHART SCALE	YEAR
			LATITUDE				
Puntarenas, Anchored	11	14A-1	+ 2.7" (83m)	+ 2.1" (64m)		1:12,500	1976
Acapulco, Main Dock	12	15A-1	- 6.8" (210m)	- 5.9" (174m)		1:25,000	1974
Acapulco, Main Dock	5	15A-3	- 6.8" (210m)	- 7.2" (213m)			
Acapulco, W of Main Dock	26	15A-2	- 7.7" (238m)	- 7.2" (213m)			
Midway, Main Pier	13	16A-1	- 14.4" (445m)	- 2.4" (65m)		1:32,500	1973
Papeete, Main Wharf	7	17A-1	+ 18.0" (556m)	- 13.3" (392m)		1:5,000	1975
Papeete, Fuel Dock	11	17A-2	+ 3.6" (111m)	- 2.4" (71m)			
Antofagasta, Sitio #2	36	18A-1	- 2.7" (83m)	+ 58.6" (1658m)		1:12,500	1976
Easter Island, Anchored	12	19A-1	- 30.4" (939m)	+ 11.6" (319m)		1:23,173	1975
Pitcairn Island, Anchored	6	20A-1	- 11.0" (340m)	- 1.2" (34m)		1:24,079	1972
Valparaiso, Berth #4	25	21A-1	- 5.5" (170m)	+ 17.3" (448m)		1:8,000	1976
Balboa, Pier #2	55	22A-1	+ 5.1" (158m)	+ 9.6" (293m)		1:12,500	1976

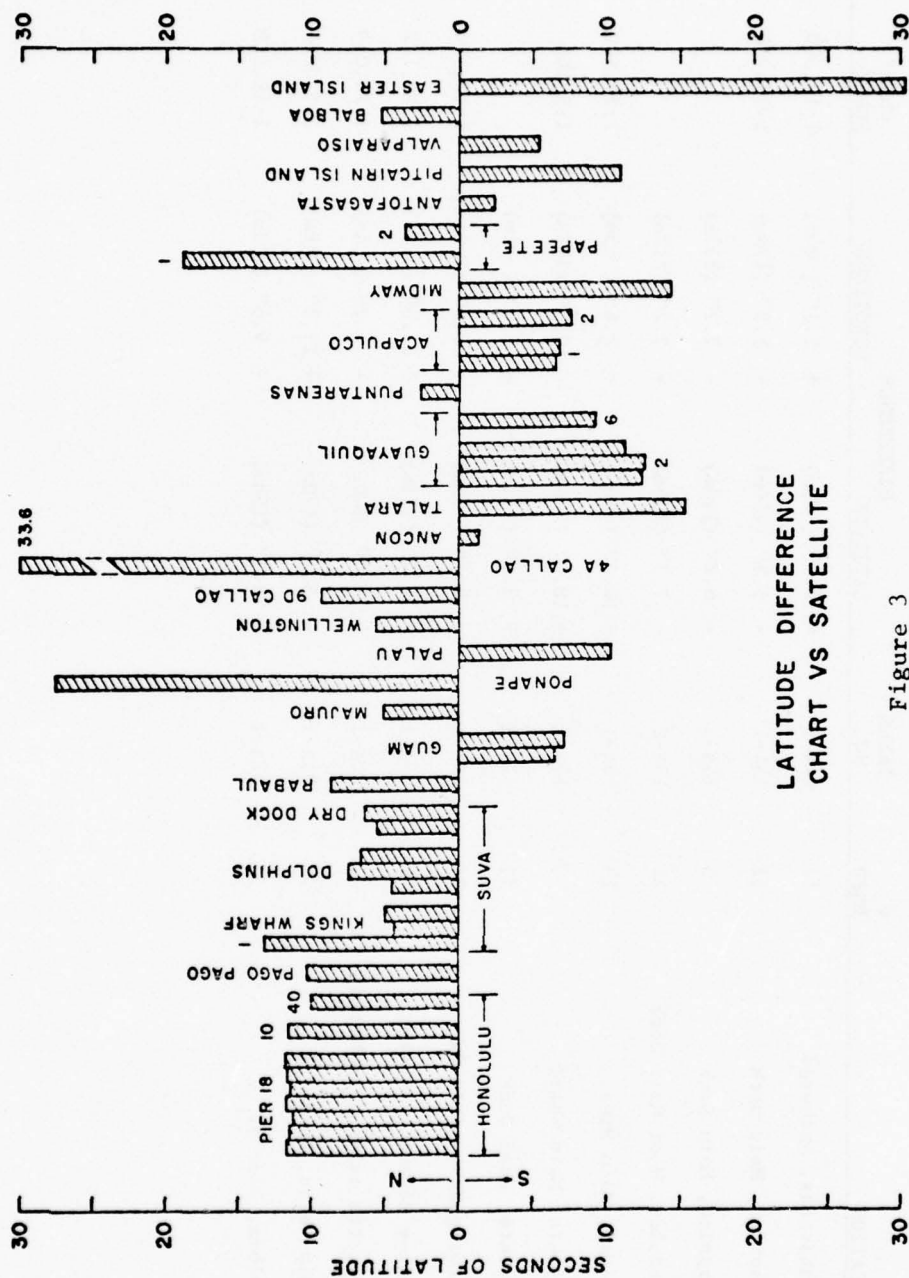
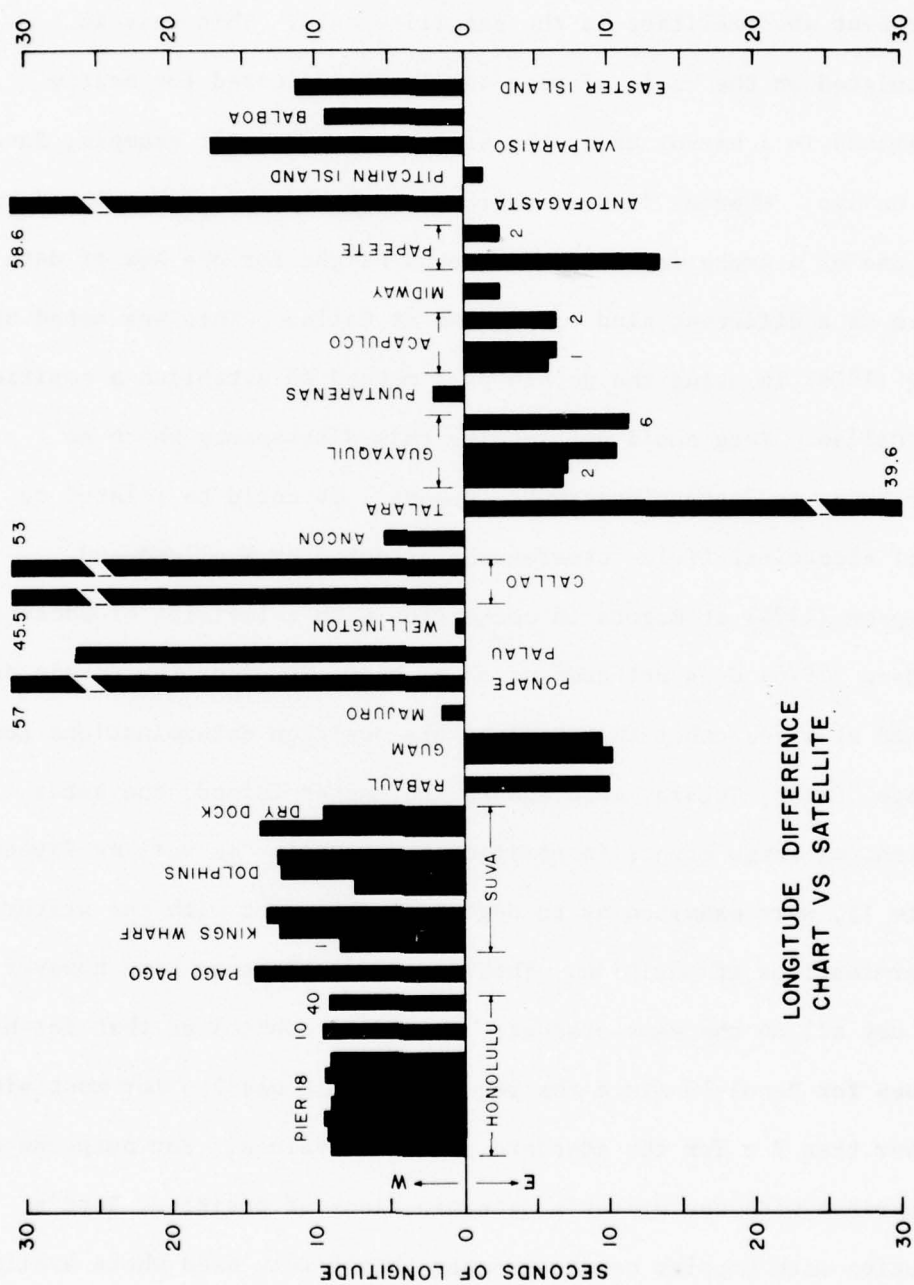


Figure 3



places. As these errors are not related to either the date of issue of the charts or chart scales, they are either real, or represent abnormalities in the satellite data. This last is postulated on the basis of poor agreement indicated for nearby locations in a harbor using the same chart. See for example, Suva and Callao. Whereas in Suva there is probably an error related to the use of a wrong initialized antenna height for one set of data there is a different kind of problem at Callao. This was noted by Berg (1976) in using the double pass method to establish a position for Callao. Berg could not resolve this discrepancy which he attributes to "causes unknown". However, it could be related to local electrical field interference as noted by Woollard and Thompson (1974) at Bogota in connection with television broadcasts. As Berg (1976) does not comment on problems in using the double pass method at sites other than Callao, his position determinations for Ponape, Palau, Talara, Antofagasta and Easter Island, the sites indicating large errors in position as at Callao as well as Papeete (site 1), were examined as to degree of agreement with the writer's determinations of position. These determinations by Berg however, are not all on the same standard of quality control as that for his values for Honolulu since the rejection limit was 3σ for most sites rather than 2σ for the standard deviation values. For purposes of comparison with the writer's determinations of position, Berg's solution with Doppler counts greater than 5 were used where available and where the count was less than 5 the site is marked with an asterisk.

		BERG (1976)	THIS STUDY	DIFFERENCE RELATIVE TO BERG
Palau	Lat	7°19.8248' (19'49.50")	7°19'49.34"	- 0.16"
	Long	134°27.3982' (27'23.88")	134°27'23.49"	- 0.39"
Ponape*	Lat	6°38.7471' (58'44.82")	6°58'44.74"	- 0.08"
	Long	158°12.030 (12'01.80")	158°12'01.97"	+ 0.17"
Talara*	Lat	4°33.7412' (33'44.46")	4°33'44.51"	+ 0.06"
	Long	81°17.3455' (17'20.73")	81°17'20.44"	- 0.29"
Antofagasta	Lat	23°39.2241' (39'13.44")	23°39'13.70"	+ 0.26"
	Long	70°24.3384' (24'20.30")	70°24'20.40"	+ 0.10"
Papeete*	Lat	17°32.0200' (32'01.20")	17°32'01.50"	+ 0.30"
	Long	149°34.3618' (34'21.68")	149°34'21.80"	+ 0.18"

Note: Easter Island was not determined by Berg.

As seen from the above comparisons the difference in values is random in sign, and nowhere exceeds 0.39" and on average is 0.21" which is insignificant in comparison with the observed difference between the writer's determination of satellite position and the chart positions for the sites in question. The indicated difference in chart positions can therefore be regarded as real, at least in terms of the reliability of the data to approximately 0.20" in latitude and longitude. In the case of Suva the discrepancy noted for King's Wharf site 1 relative to the other two determinations at the same location is undoubtedly related to the use of the wrong initialized antenna height for this series of observations. A value of 75 meters was used for the first observations rather than the more correct height of 54 meters which was used for the later

determinations. This explanation, however, does not explain the apparent discrepancy noted between sites 1 and 2 at Papeete. The most logical explanation for these discrepancies brought out by Berg (1976) is that the ephemeris for certain satellites at times is in error. That the ship's position was located in error on the chart, or else there are discrepancies on the charts for the locations shown for some of the port facilities, is not regarded as being as an important source of error.

As none of the discrepancies between chart positions and satellites positions exceed 1 minute of arc in either latitude or longitude, it would appear that all the charts used have at least this degree of reliability, and most a reliability of better than 20 seconds in both latitude and longitude.

CONCLUSIONS

In this study of the reliability of charted positions for port locations in the Pacific area using the Navy Navigation Satellite System as a standard for evaluating position location, several points were brought into focus concerning the reliability of satellite defined positions that had not been anticipated in advance of undertaking this study. Although outside the primary objective of the study, the general importance of these auxiliary findings appears to make them worthy of inclusion as one of the principal results obtained from this study since for the most part

they are not alluded to in previously published papers on the reliability of satellite defined positions so far as the writer is aware. These can be summarized briefly as follows. (1) The standard deviations in satellite-defined values of position of latitude and longitude using all satellite passes are not improved by having multiple observation samples in excess of 55 observations. (2) The distribution of values of standard deviation for a series of multiple passes converges as the number of passes increases towards an intermediate value between a minimum and maximum value which is not the same for both latitude and longitude. (3) The distribution of values of standard deviation for multiple observations does not define a Gaussian (normal) distribution, but portrays a bimodal distribution that is most pronounced in the latitude observations. (4) In the case of both latitude and longitude position there are certain series of values whose standard deviations depart significantly from the other values taken as a whole. In most cases both the latitude and longitude standard deviations for the sites involved appear to be anomalous although this is not always the case. Although most of these sites having an anomalous high standard deviation value occur along the Pacific coasts of Central and South America where there is a steep gravity and geoidal gradient, an error in initialized antenna height does not appear to be the explanation for the anomalous values as other sets of values at the same sites are not anomalous. As all data were subject to the same selection and editing criteria, there is, therefore, no obvious

explanation other than that certain sets of satellite data incorporated errors in ephemeris values at times.

In terms of primary objectives of this study it was found that charted positions agreed well with satellite positions for some locations in a given port but appeared to be less good at an adjacent nearby location. In each such case it was found that the standard deviation for the satellite position was anomalously high where there were local discrepancies of the order of 5 seconds or more. Although in part such discrepancies could be related to the use of a wrong initialized antenna height in defining the satellite position, this point could only be demonstrated for one site, Suva. No relation was noted between the date of issue of a chart (all were post 1923 editions with most post 1974), or the scale of the charts, which varied from 1:5,000 to 1:36,460, and indicated errors in position. In general, agreement was within ± 15 seconds in latitude and longitude, but certain sites (Ponape, Palau, Talara, Antofagasta and Easter Island) appeared to have either one or both sets of coordinates in error by 30 seconds or more. Although a similar degree of error is indicated for Callao, this may only be an apparent error as the satellite data cannot be regarded as reliable.

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APPENDIX A

ALPHABETICAL LISTING OF HARBOR CHARTS

<u>LOCATION</u>	<u>FIGURE</u>	<u>PAGE</u>
ACAPULCO	20	63
ANCON	16	59
ANTOFAGASTA	23	66
CALLAO	15	58
EASTER ISLAND	24	67
GUAM	10	53
GUAYAQUIL	18	61
HONOLULU	5, 6	48, 49
MAJURO	11	54
MIDWAY	21	64
PAGO PAGO	7	50
PALAU	13	56
PAPEETE	22	65
PANAMA	27	70
PITCAIRN ISLAND	25	68
PONAPE	12	55
PUNTARENAS	19	62
RABAU	9	52
SUVA	8	51
TALARA	17	60
VALPARAISO	26	69
WELLINGTON	14	57

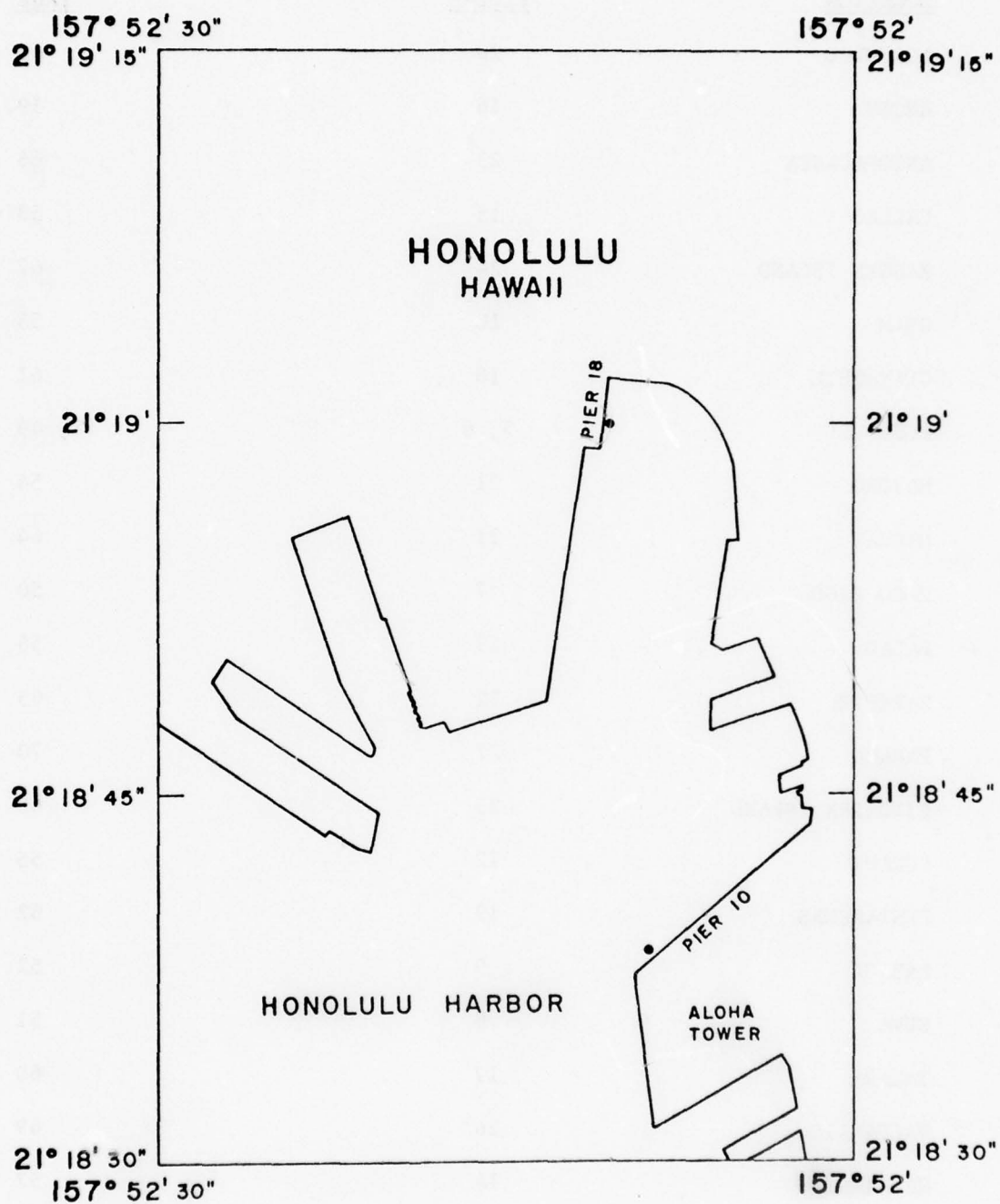


Figure 5

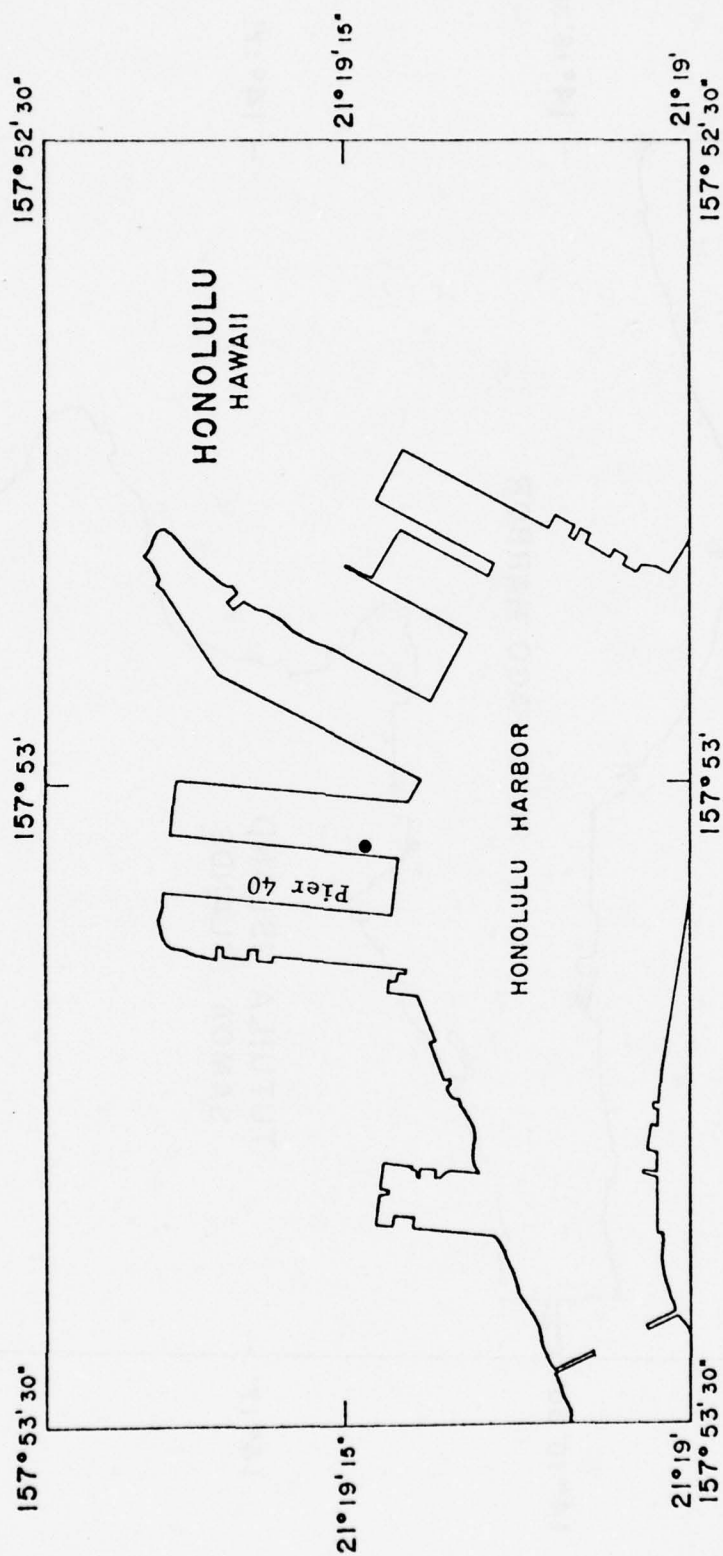


Figure 6

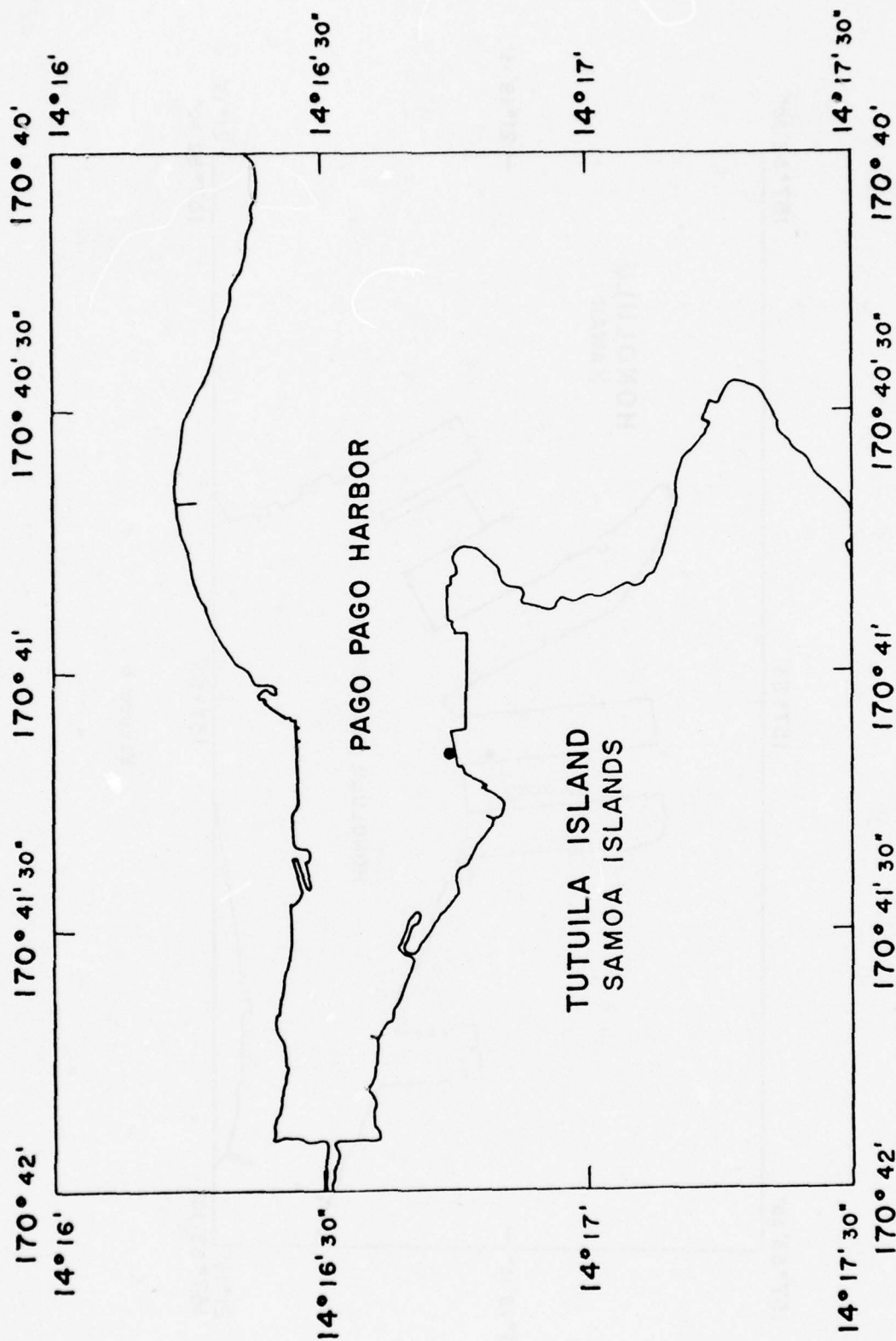


Figure 7

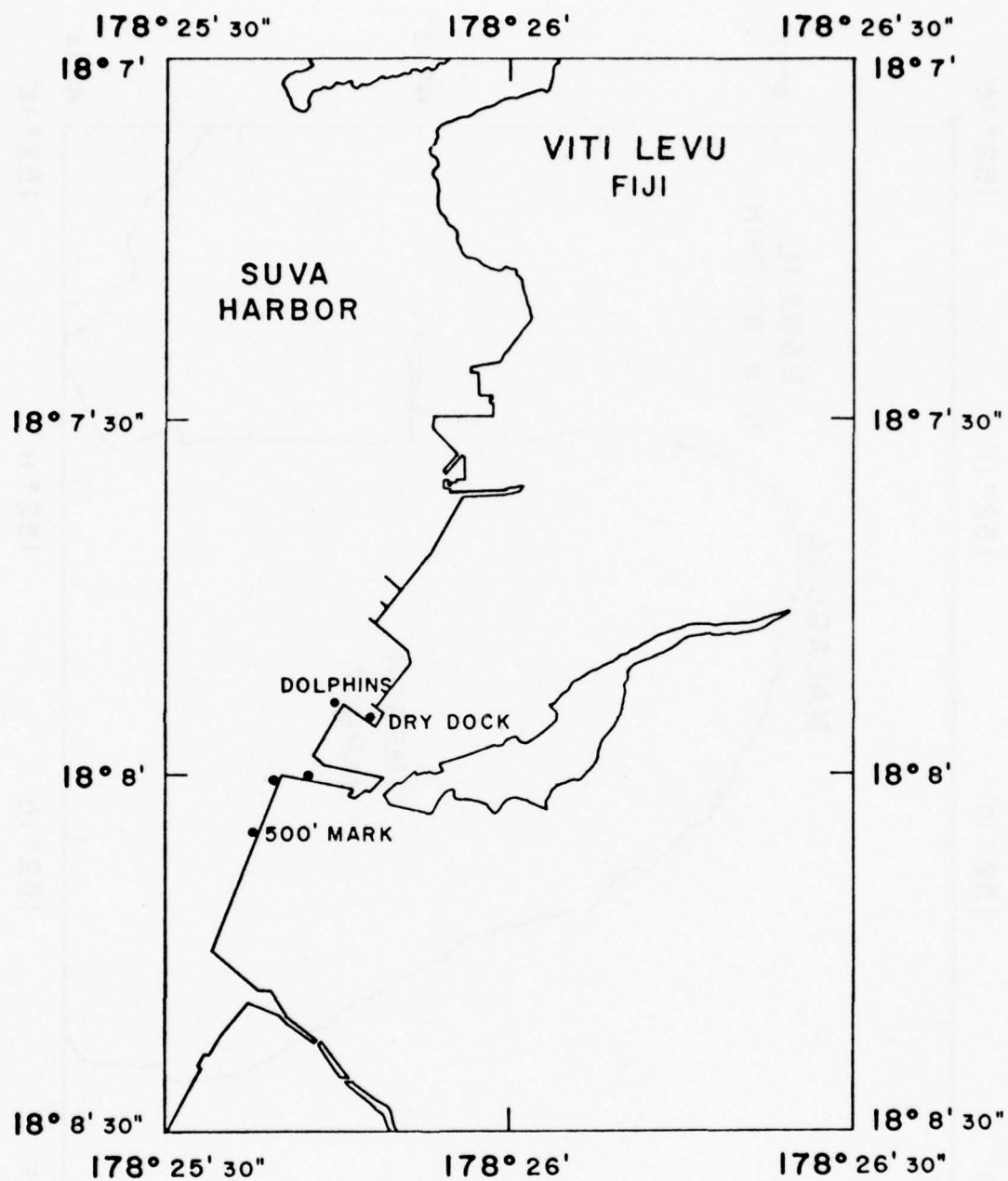


Figure 8

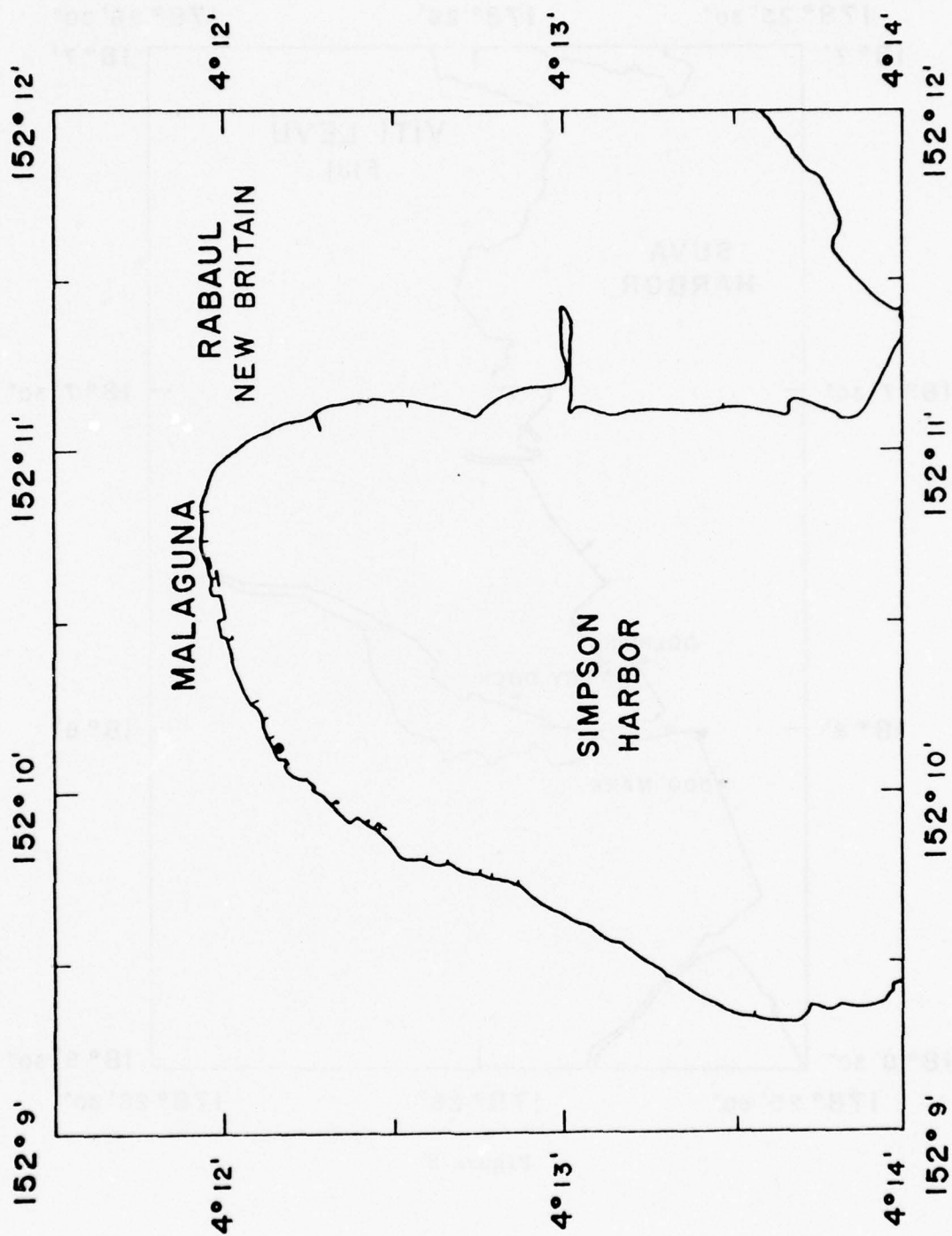


Figure 9

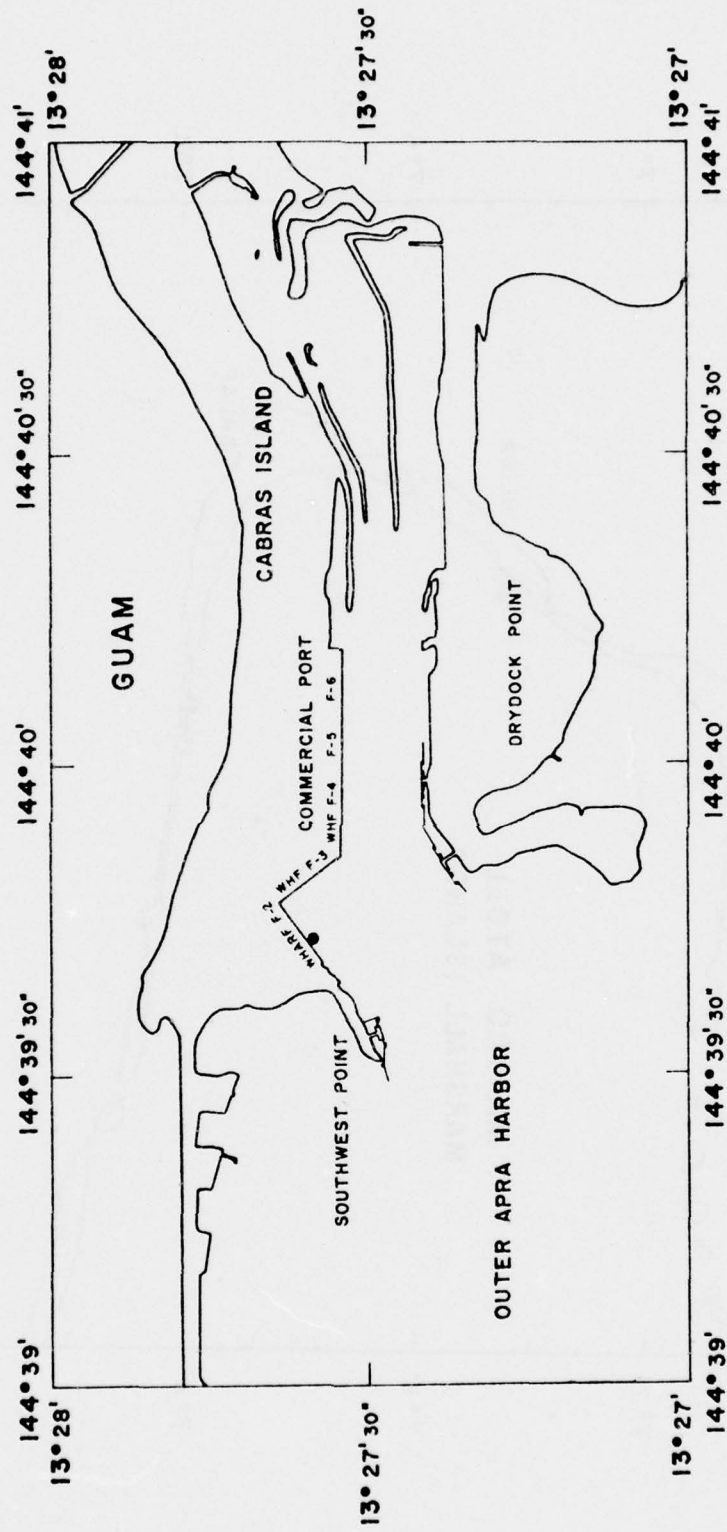


Figure 10

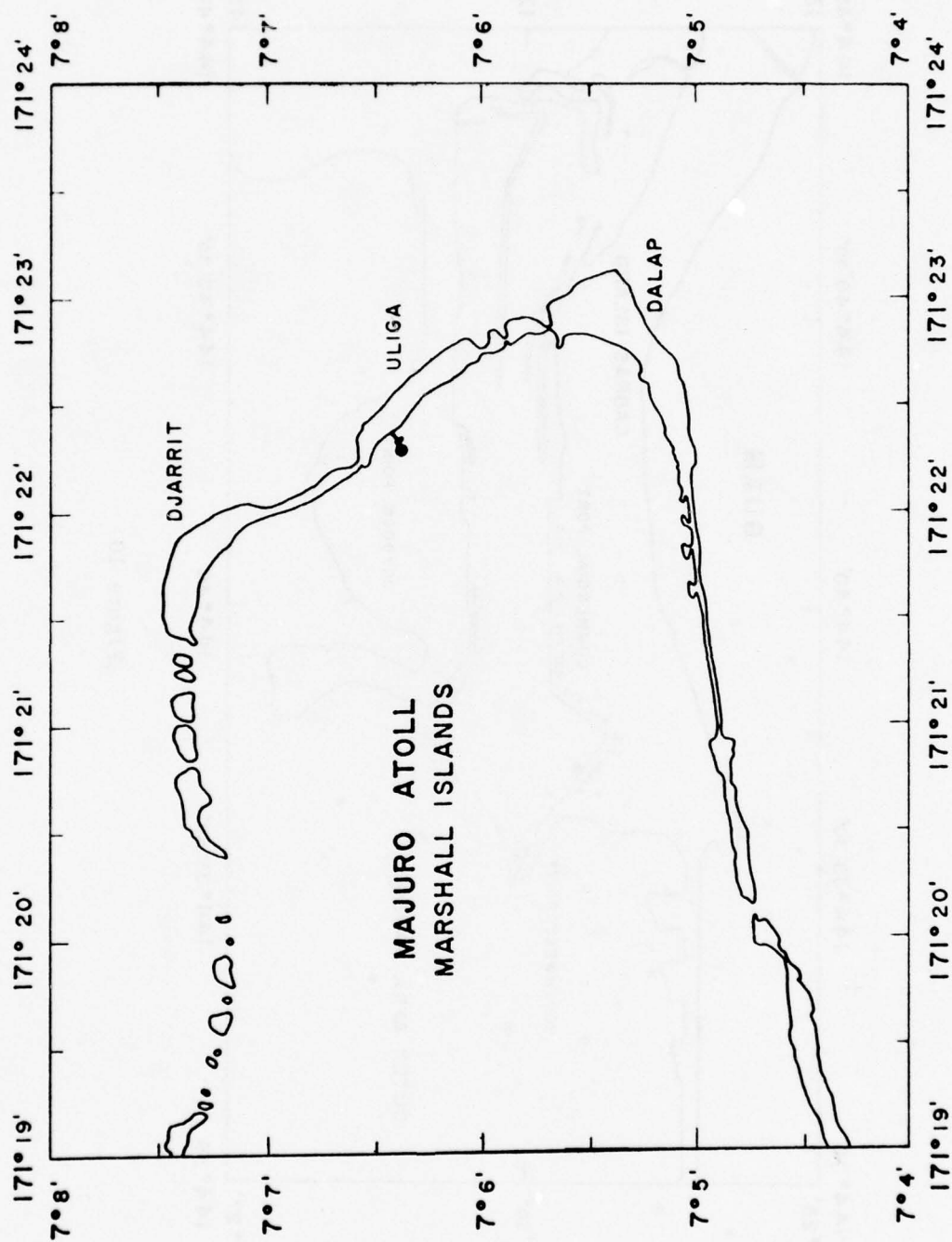


Figure 11

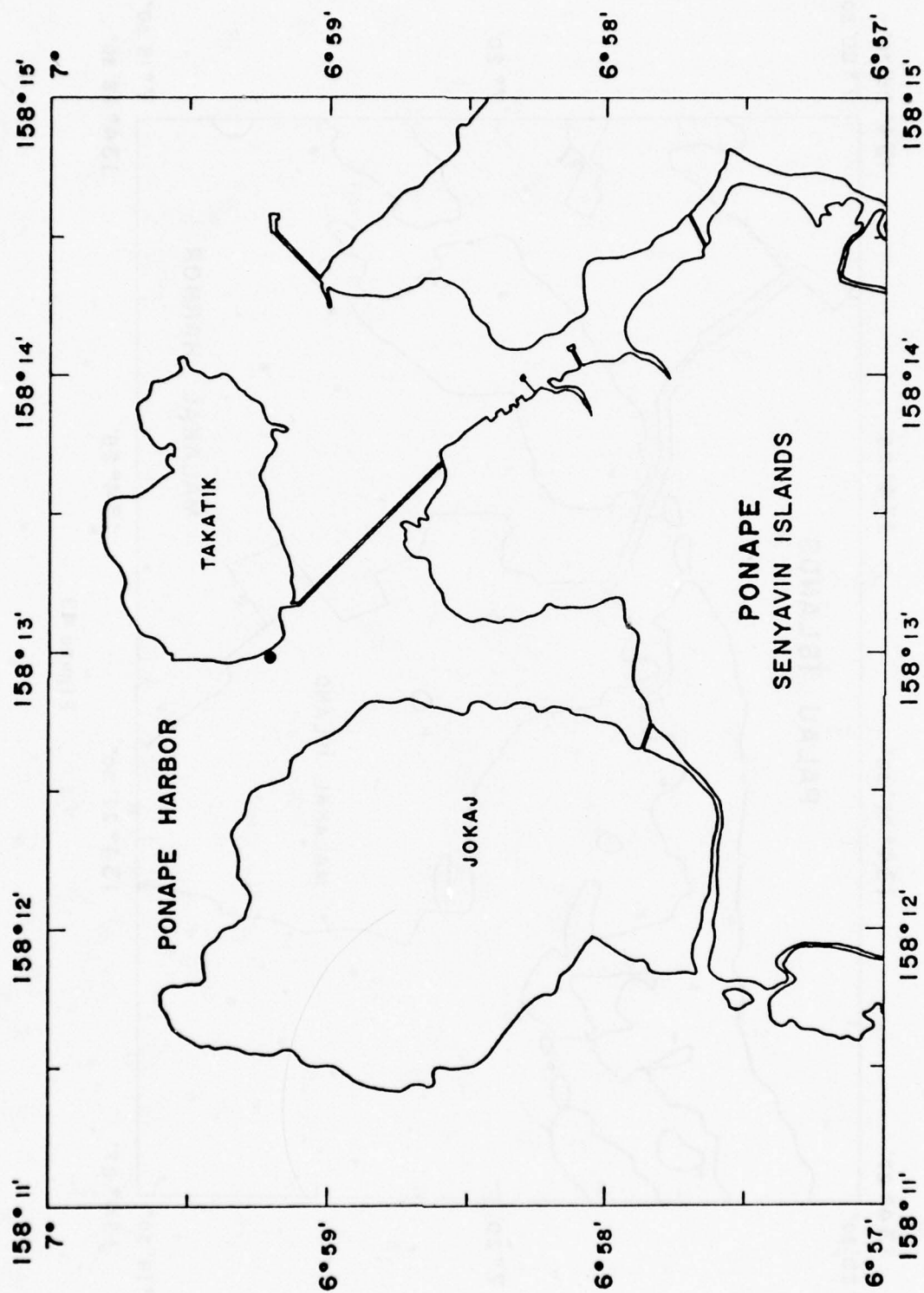


Figure 12

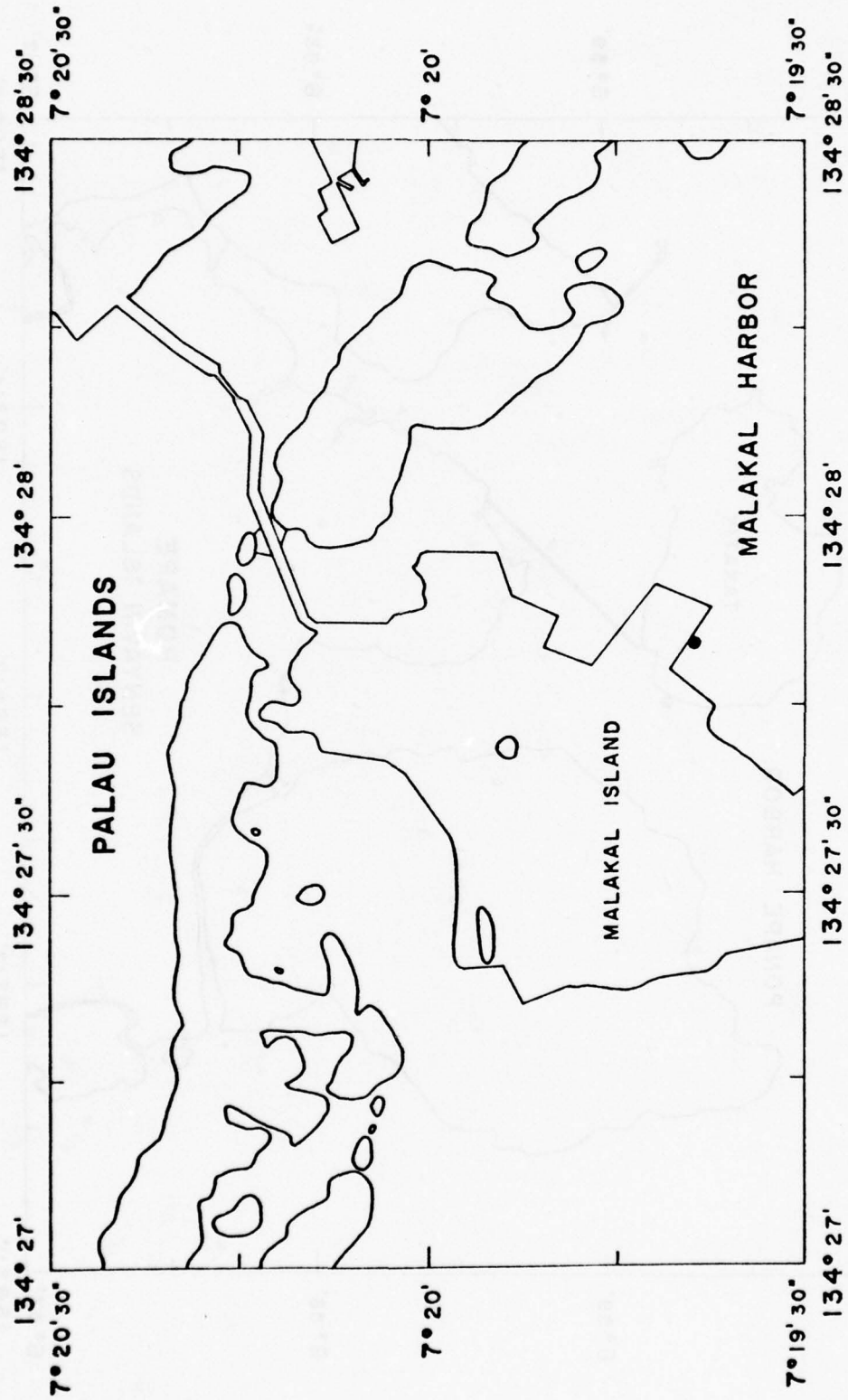


Figure 13

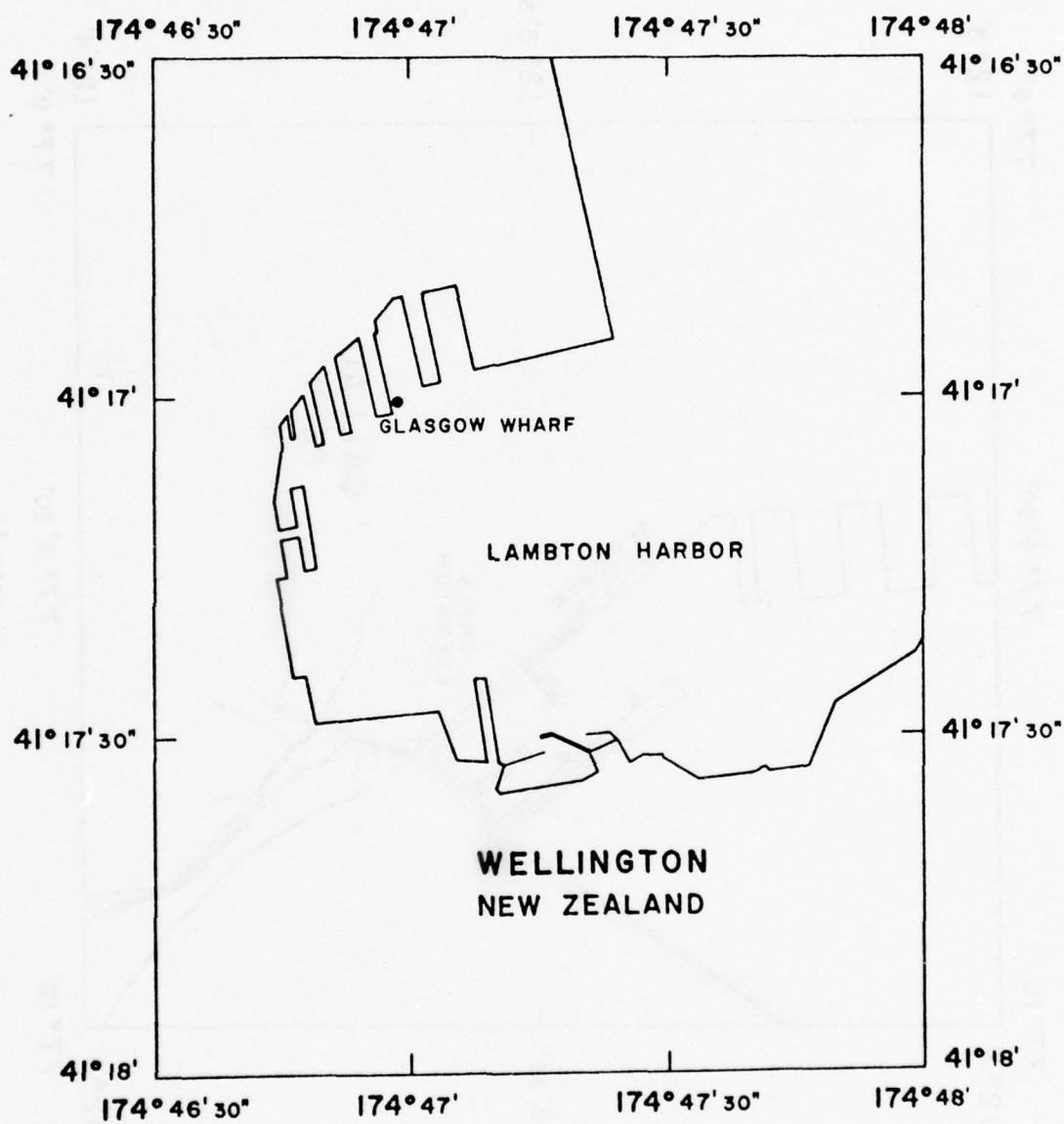


Figure 14

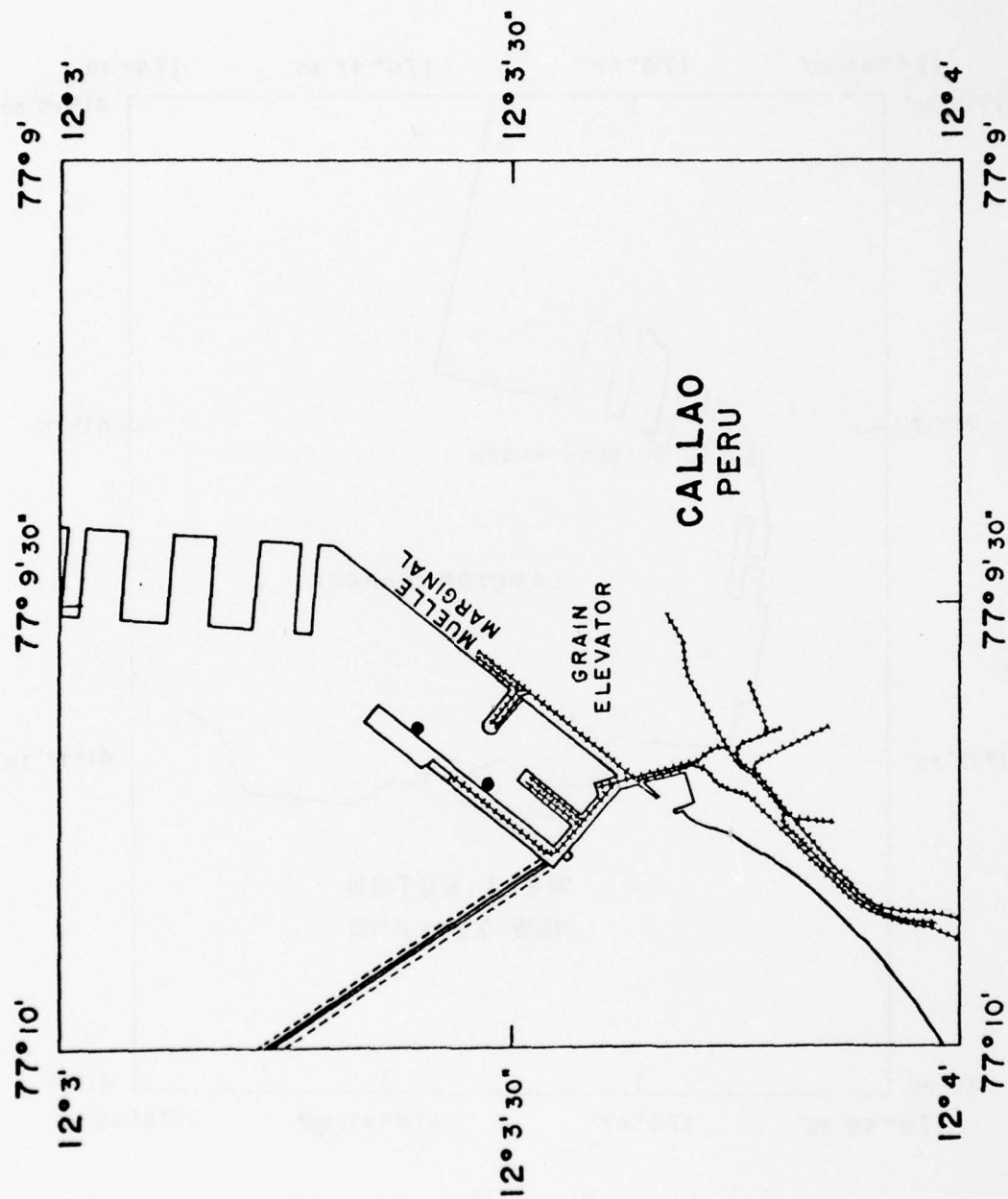


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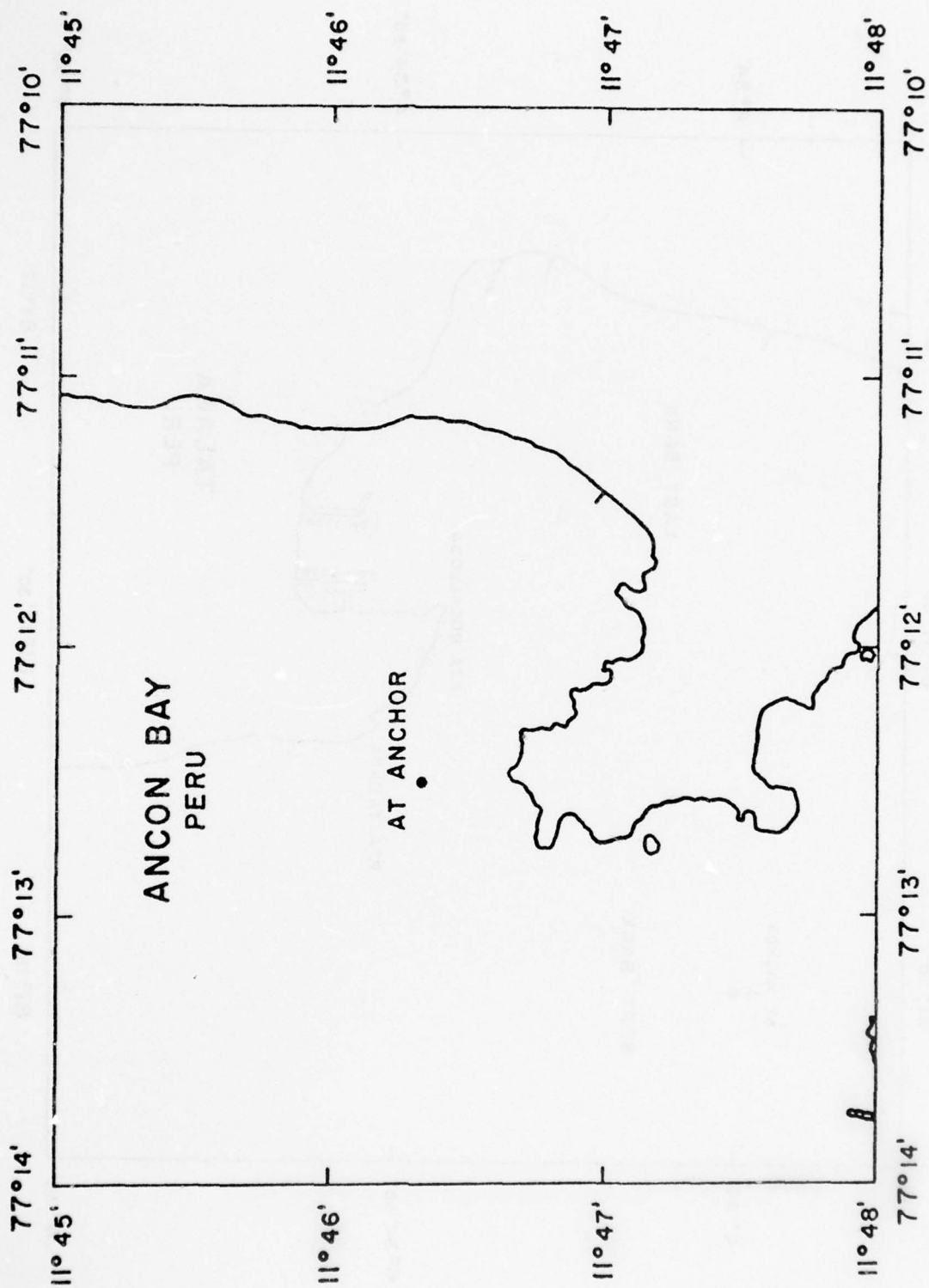


Figure 16

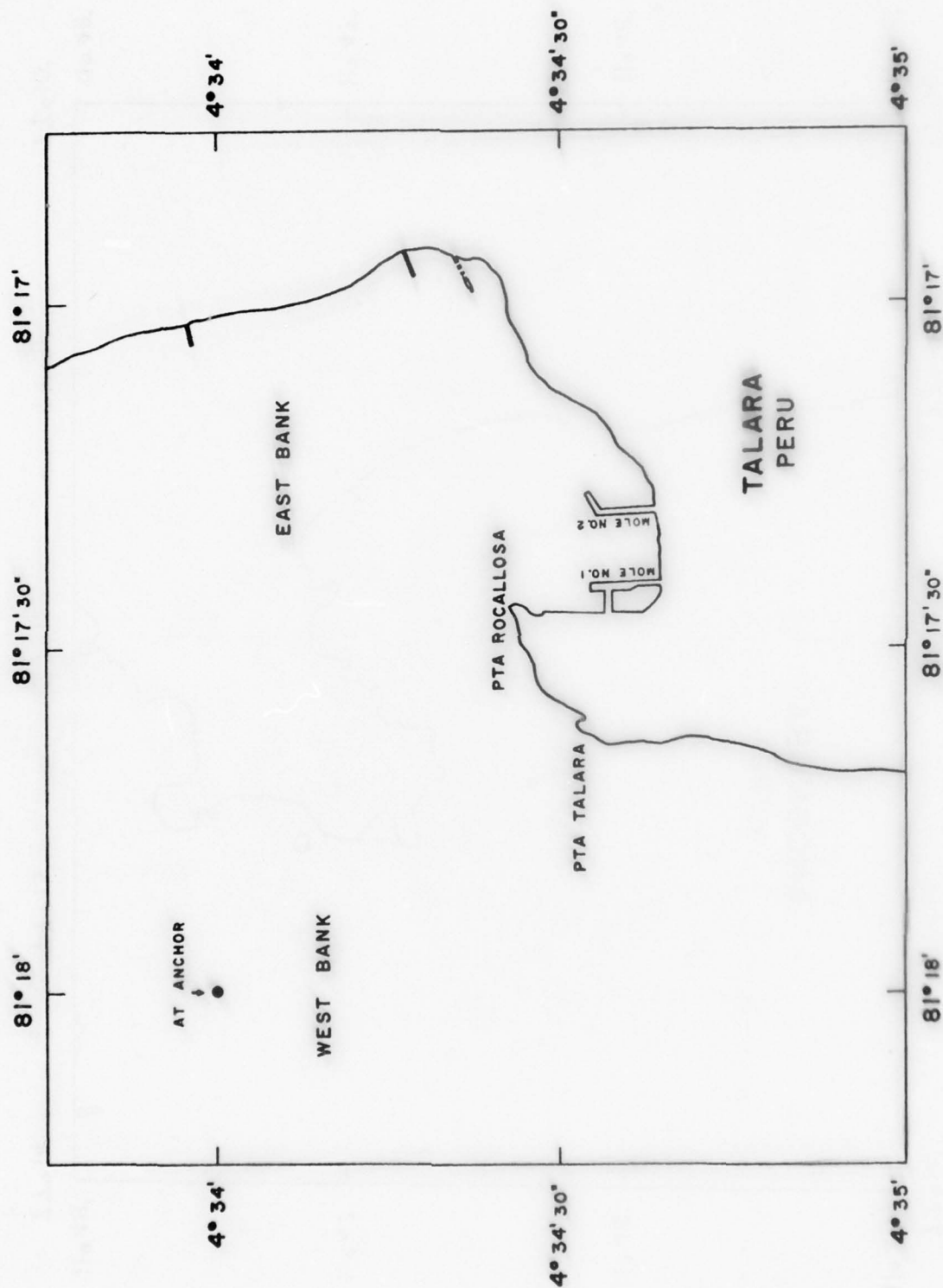


Figure 17

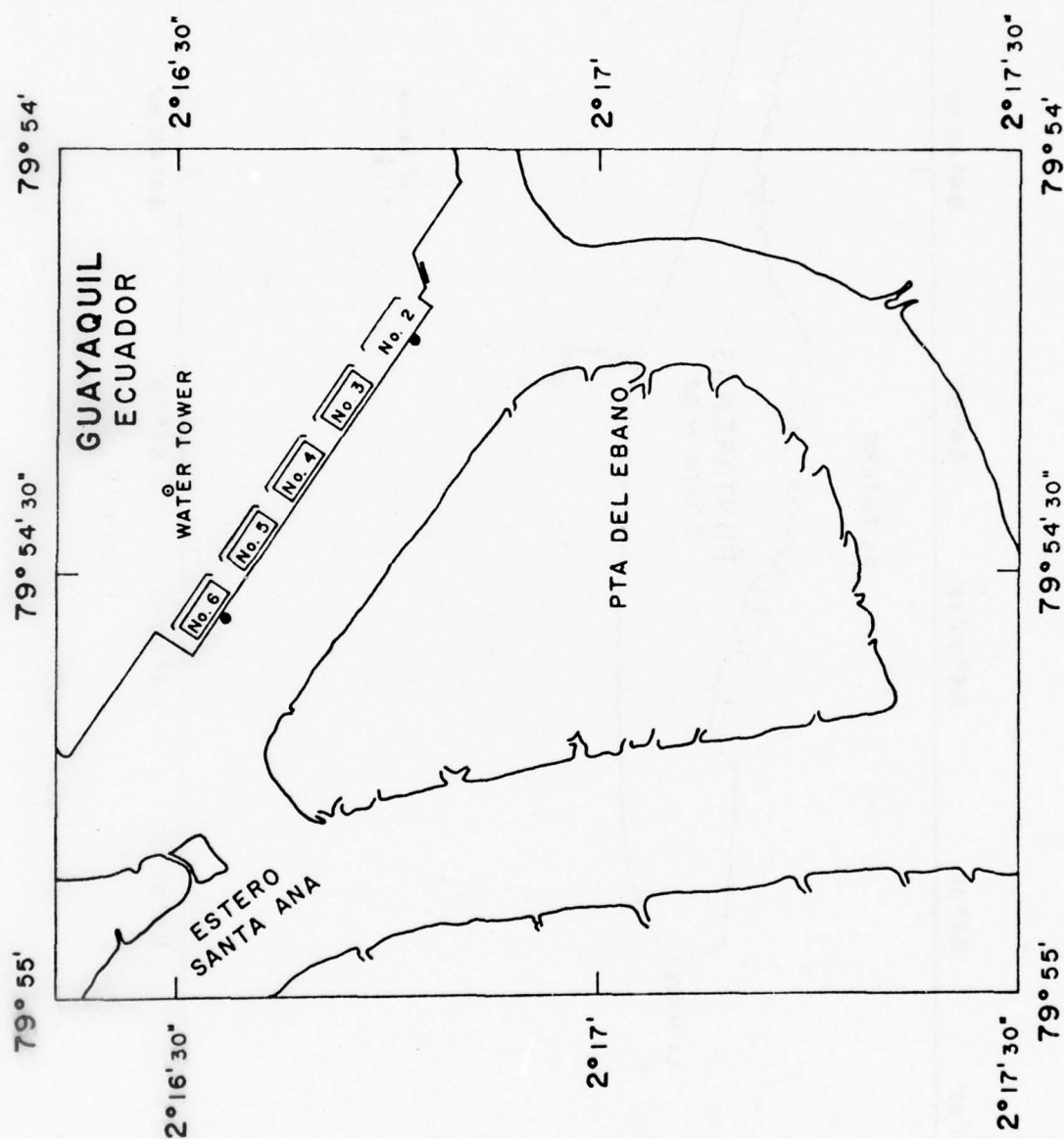


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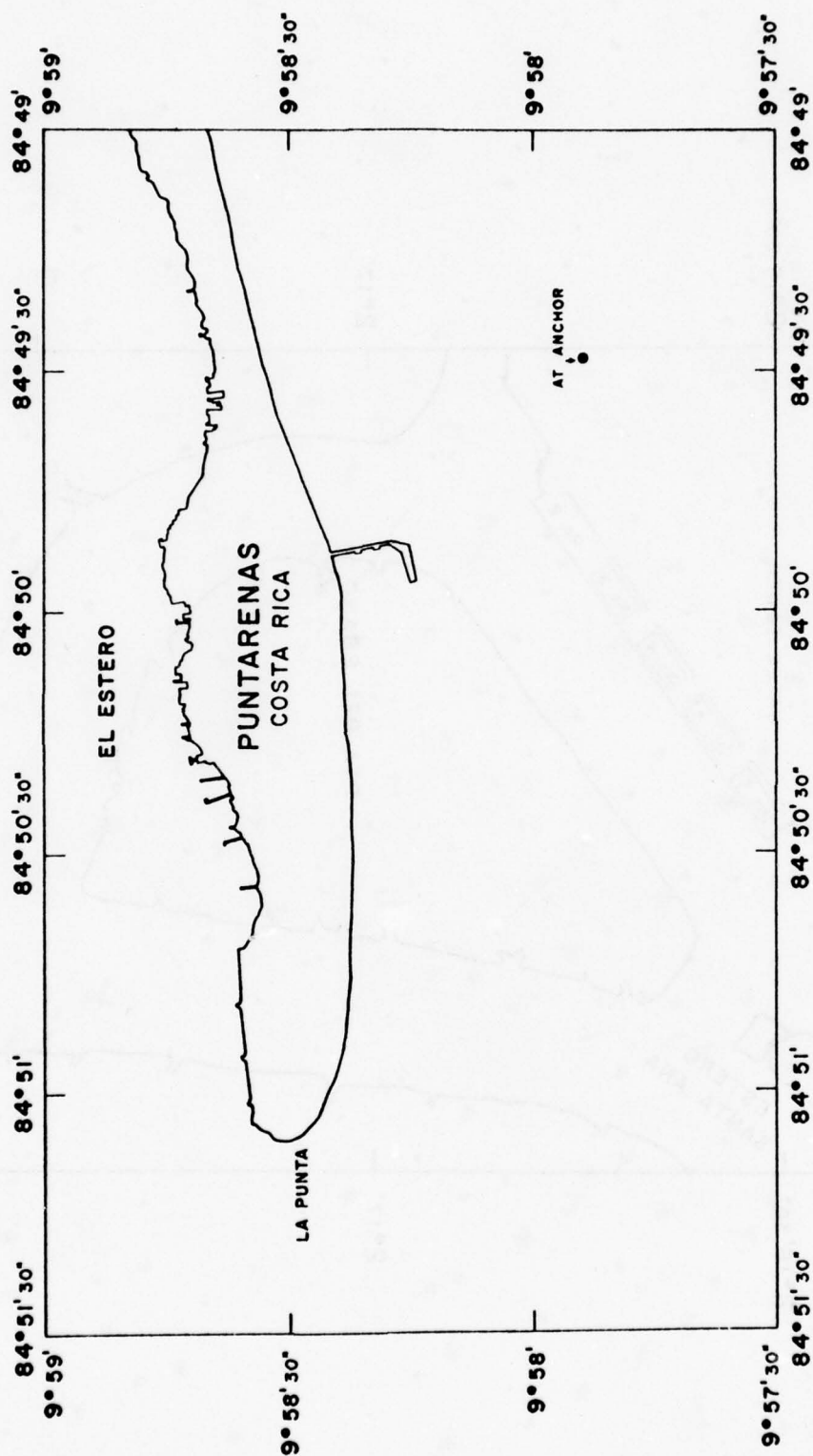


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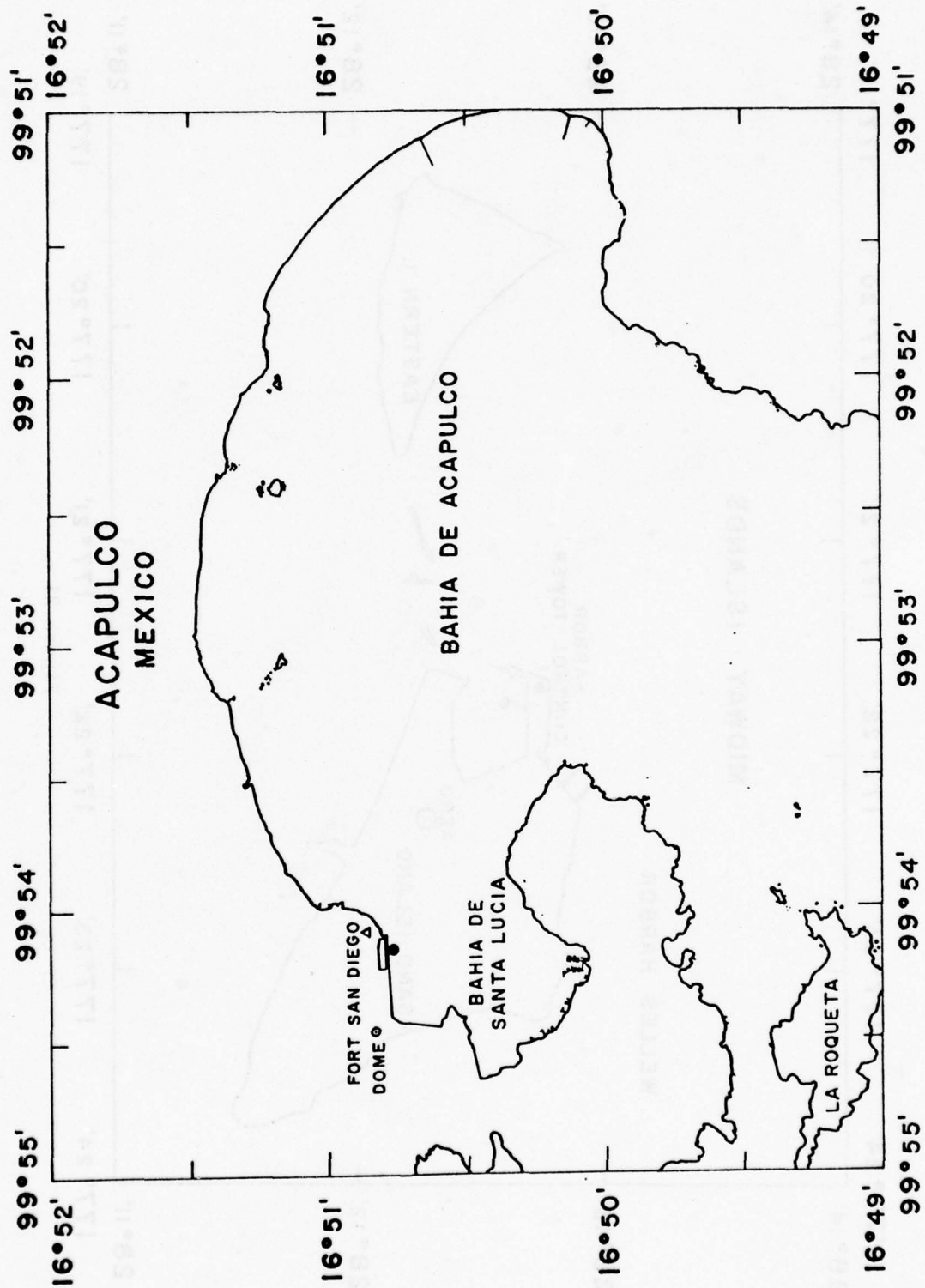


Figure 20

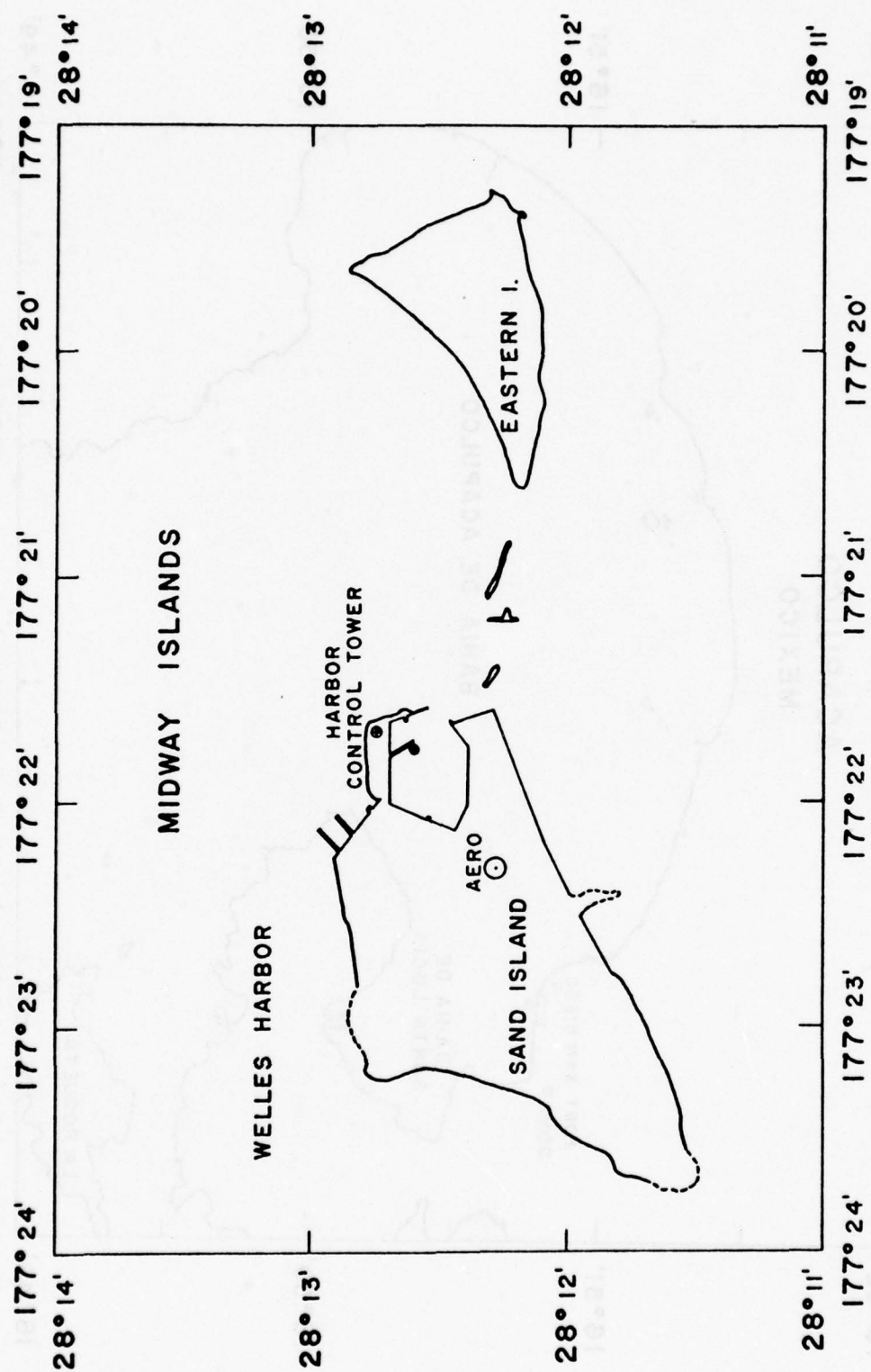


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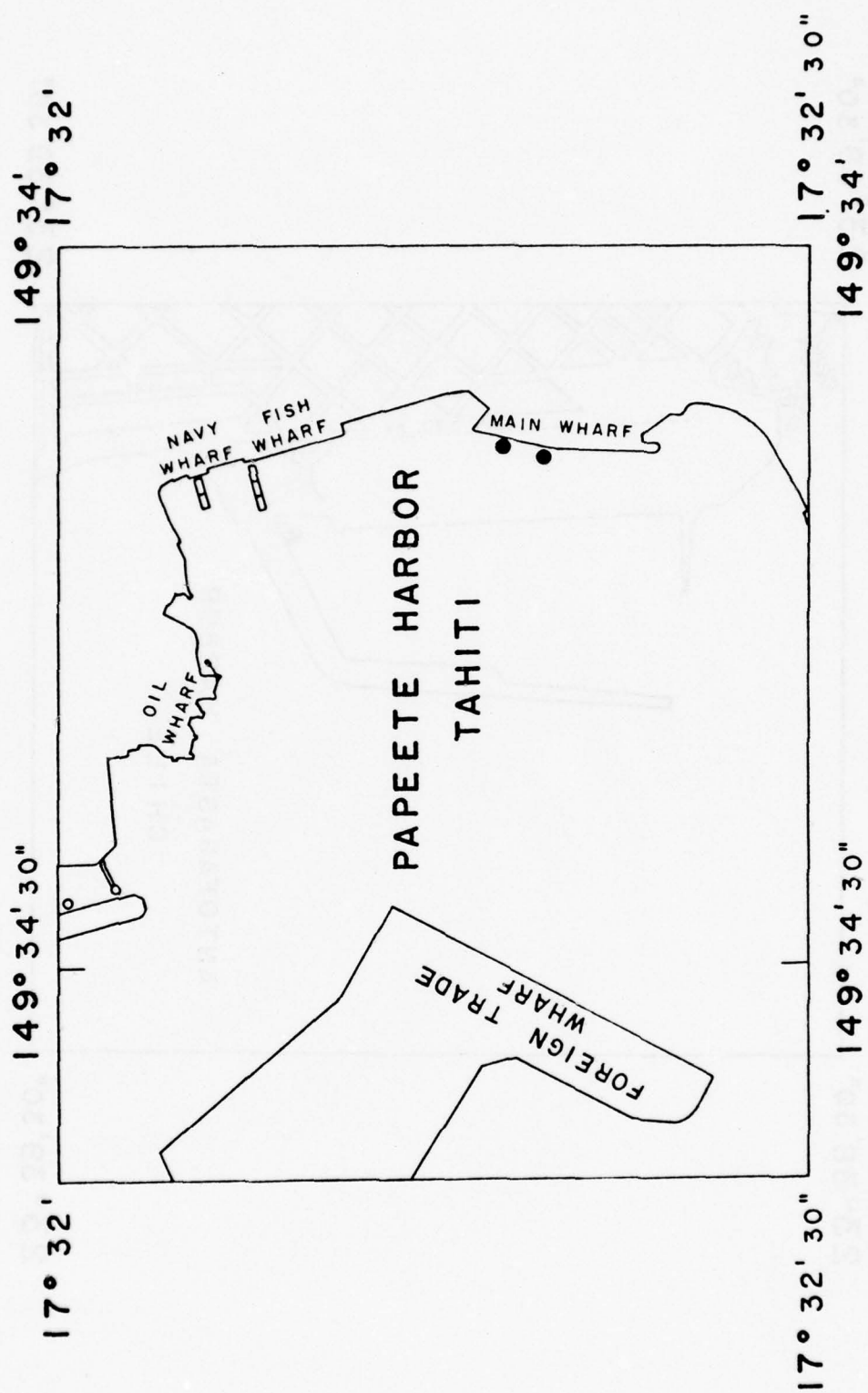


Figure 22

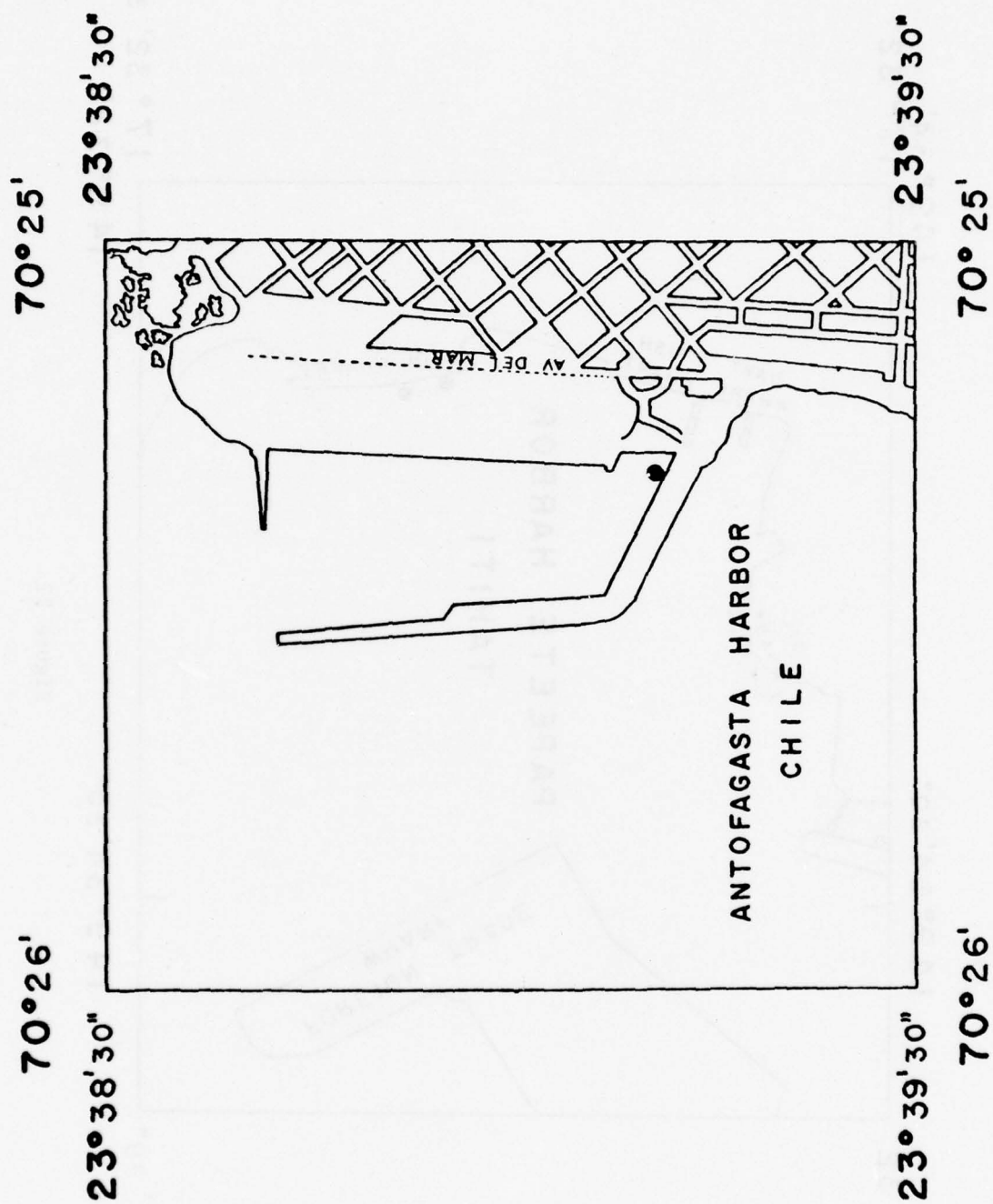


Figure 23

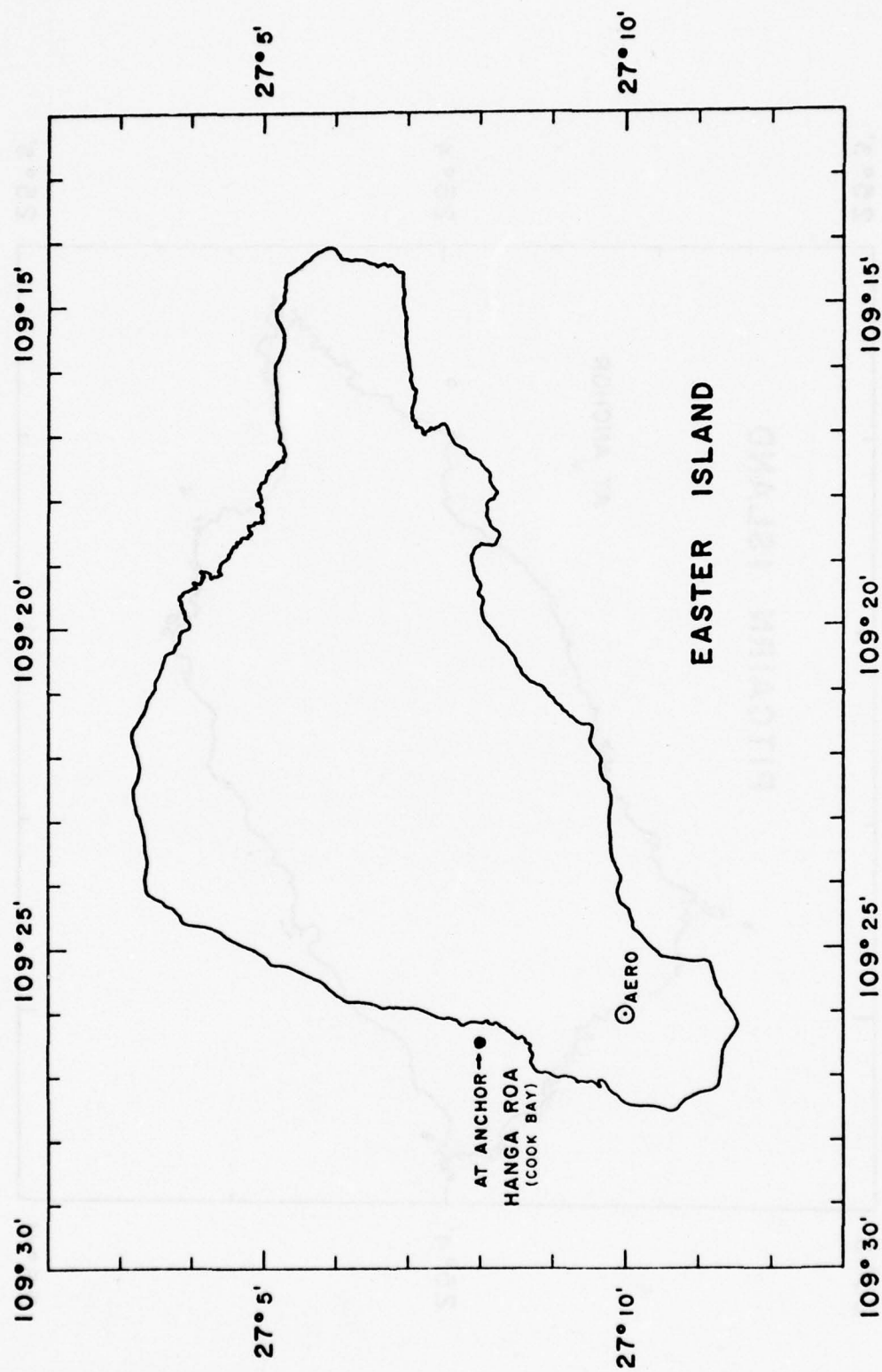


Figure 24

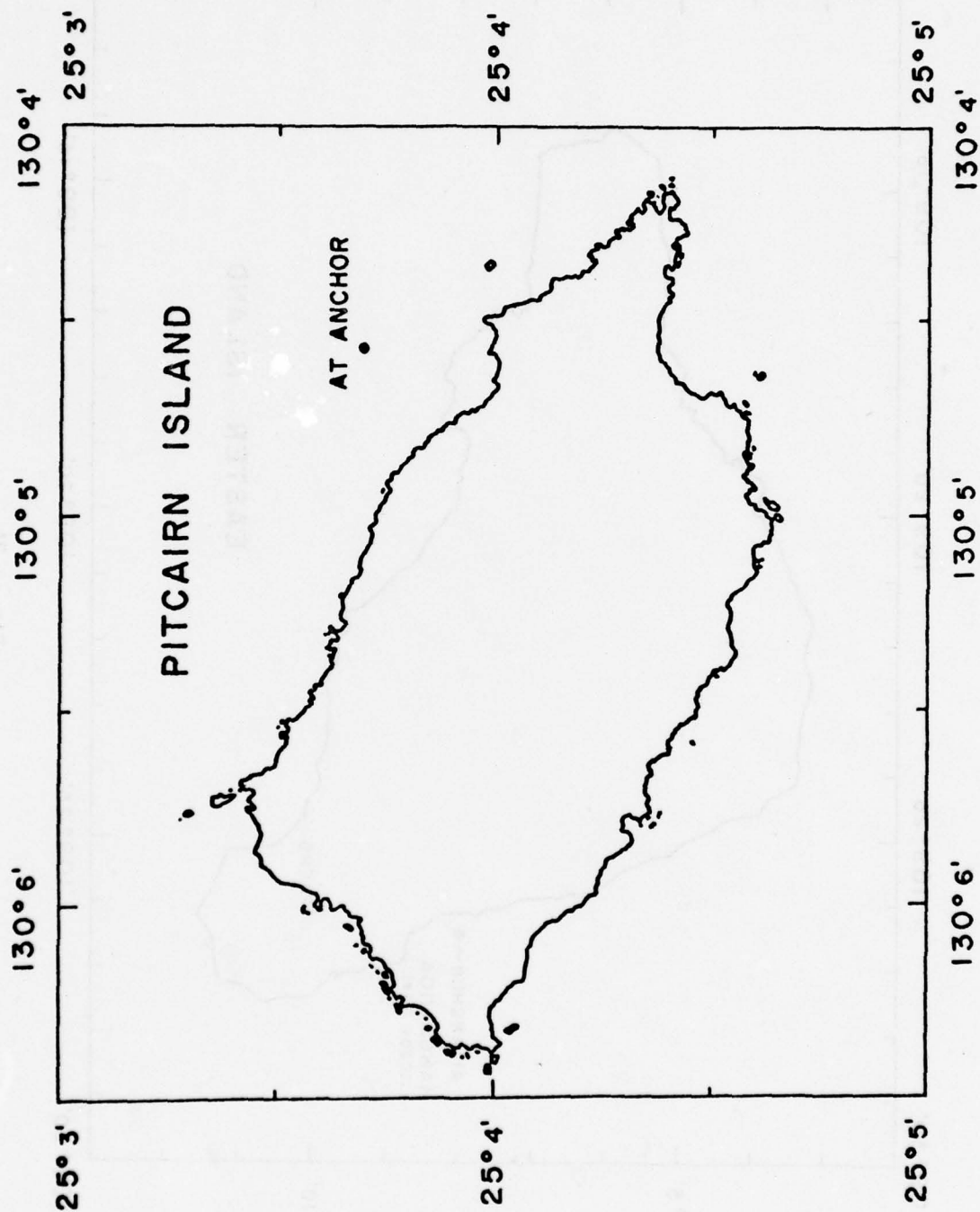


Figure 25

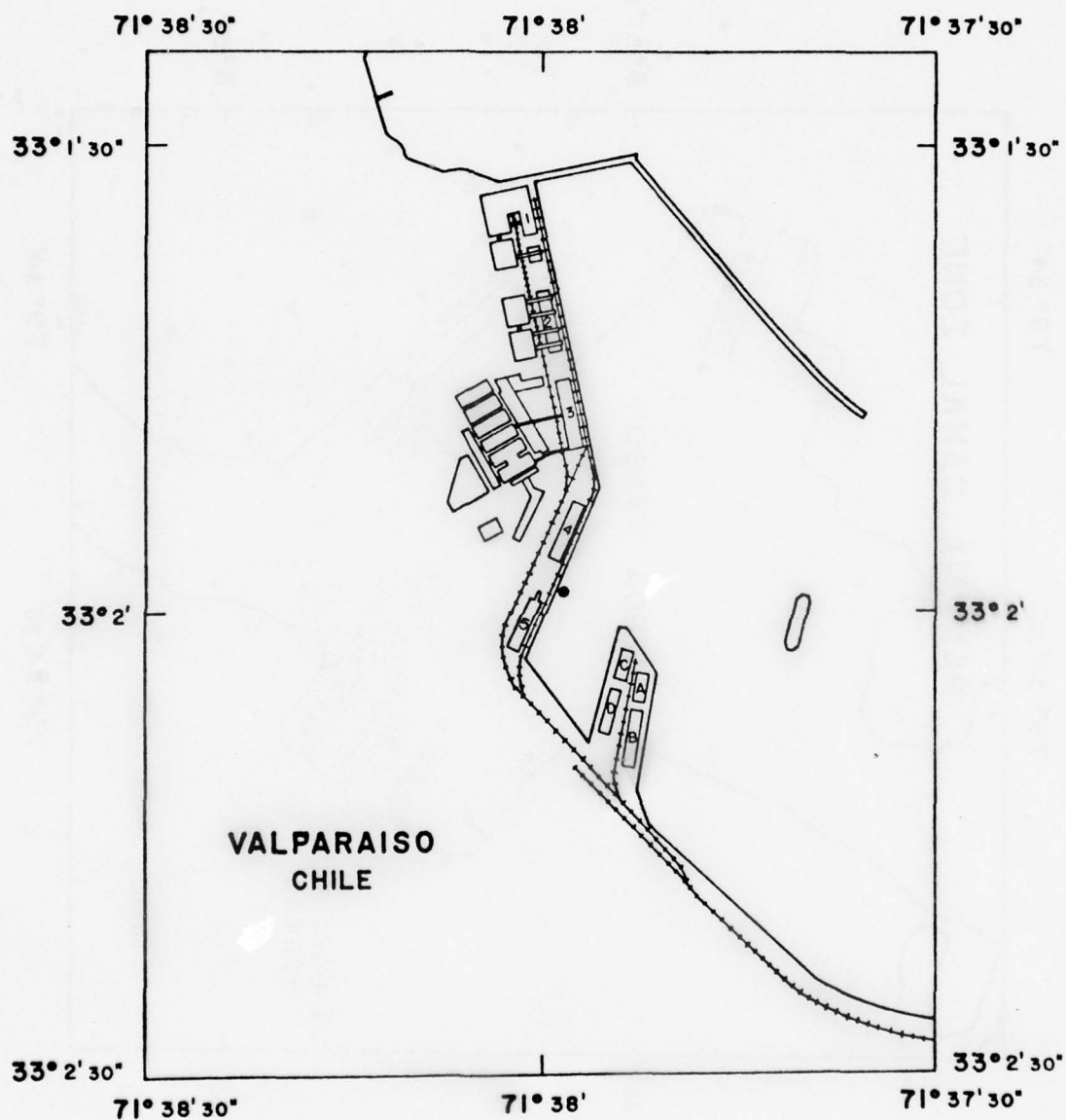


Figure 26

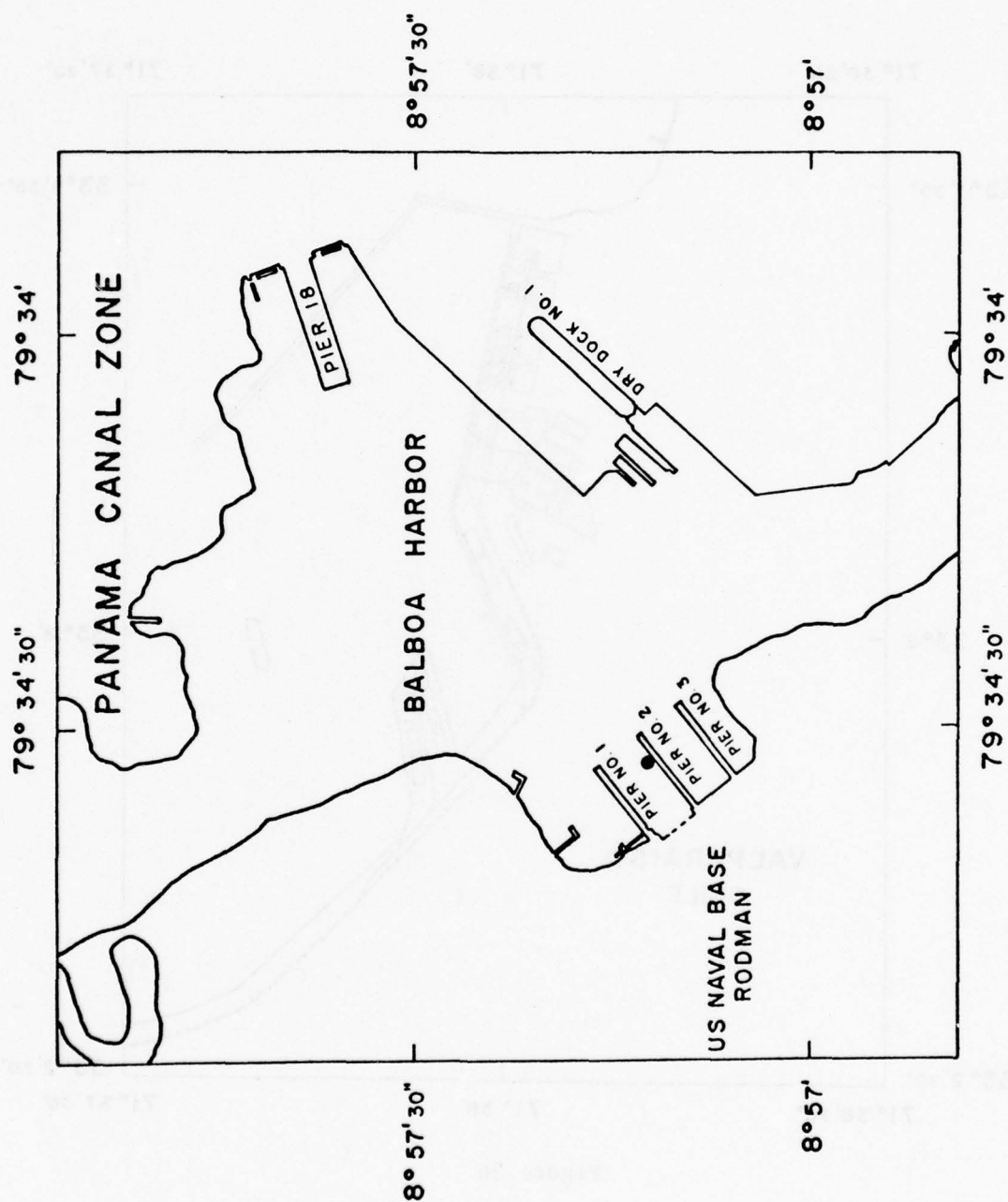


Figure 27

APPENDIX B

ALPHABETICAL LISTING OF DATA TABLES

<u>LOCATION</u>	<u>TABLE</u>	<u>PAGE</u>
ACAPULCO	15A-1 to 15A-3	122
ANCON	11A-1	113
ANTOFAGASTA	18A-1	129
CALLAO	10A-1 to 10A-2	109
EASTER ISLAND	19A-1	131
GUAM	5A-1 to 5A-2	101
GUAYAQUIL	13A-1 to 13A-4	115
HONOLULU	1A-1 to 1A-9	73
MAJURO	6A-1	103
MIDWAY	16A-1	126
PAGO PAGO	2A-1	90
PALAU	8A-1	105
PAPEETE	17A-1 to 17A-2	127
PANAMA	22A-1	134
PITCAIRN ISLAND	20A-1	132
PONAPE	7A-1	104
PUNTARENAS	14A-1	121
RABAU	4A-1	100
SUVA	3A-1 to 3A-8	91
TALARA	12A-1	114
VALPARAISO	21A-1	133
WELLINGTON	9A-1	107

TABLE 1A-1

R/V MAHI 1970 POSITIONAL DATA, HONOLULU, HAWAII
AT PIER 18, STARBOARD SIDE TO DOCK

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
56	1038	64	26		21 18 47.76N	157 52 1.06W	3	30	15	-0.5	0.4
56	1224	64	30		21 18 44.84N	157 52 2.04W	2	29	12	0.6	1.4
56	1520	63	35		21 18 40.66N	157 52 1.32W	2	31	5	2.2	-0.2
56	1646	63	25		21 18 45.56N	157 52 1.70W	2	29	18	1.3	-0.2
56	1726	63	26		21 18 45.08N	157 52 2.10W	2	30	18	0.6	0.6
56	1832	64	34		21 18 50.58N	157 52 2.34W	2	32	15	2.3	1.0
56	2024	42	61		21 18 47.40N	157 52 2.62W	2	28	2	-0.8	1.3
56	2226	64	22		21 18 46.14N	157 51 56.62W	2	25	9	0.9	-2.0
57	12	64	37		21 18 47.76N	157 52 2.04W	2	31	12	-0.5	0.5
57	248	63	14		21 18 47.08N	157 51 46.64W	2	19	9	-0.3	-1.9
57	618	64	44		21 18 40.64N	157 52 2.16W	4	29	7	0.3	0.6
57	622	42	13		21 18 44.44N	157 52 3.34W	3	15	4	-3.8	3.8
57	1134	64	73		21 18 46.58N	157 52 4.24W	2	34	0	-1.2	2.7
57	1436	63	13		21 18 45.42N	157 52 0.64W	3	20	0	-0.4	-0.9
57	1420	63	60		21 18 48.06N	157 52 1.24W	2	31	0	-0.2	-0.3
57	1742	64	72		21 18 46.62N	157 51 51.24W	6	30	0	-1.6	-8.3
57	1840	42	46		21 18 47.66N	157 52 1.10W	2	28	7	-0.3	-0.2
57	2116	42	19		21 18 48.24N	157 52 2.34W	2	25	12	0.0	0.9
57	2322	64	67		21 18 46.44N	157 48 15.64W	2	14	0	12.6	-321.9
58	344	63	55		21 18 45.48N	157 52 6.64W	4	24	1	-2.7	-2.9
58	452	42	13		21 18 47.34N	157 52 1.64W	2	22	5	-0.6	-0.3
58	716	63	10		21 18 50.06N	157 52 1.24W	2	14	6	3.0	-0.3
58	816	42	42		21 18 48.36N	157 52 2.04W	2	30	12	0.1	0.6
58	1046	64	42		21 18 47.22N	157 52 1.74W	2	34	16	-1.0	0.2
58	1234	64	20		21 18 44.44N	157 52 1.74W	2	25	10	0.3	0.2
58	1530	63	50		21 18 46.60N	157 52 2.04W	2	34	1	1.3	0.6
58	1650	64	33		21 18 47.76N	157 52 1.32W	2	32	15	-0.5	-0.3
58	1720	63	18		21 18 47.14N	157 52 2.62W	2	26	12	-1.1	1.3
58	2022	42	55		21 18 46.72N	157 52 1.62W	2	22	15	0.5	0.1
58	2236	64	33		21 18 43.80N	157 52 0.64W	2	28	8	1.6	-0.0
59	22	64	25		21 18 48.60N	157 52 2.24W	2	20	14	0.4	0.7
59	256	63	22		21 18 48.22N	157 52 1.32W	2	16	0	-4.0	-0.2
59	438	64	24		21 18 48.48N	157 52 5.14W	2	24	10	0.3	-0.3
59	622	64	13		21 18 48.36N	157 52 1.34W	2	28	5	0.2	1.8
59	742	42	66		21 18 46.30N	157 51 57.00W	2	27	3	-1.0	-3.6
59	826	42	11		21 18 45.60N	157 52 6.02W	2	13	3	-2.6	4.5
59	1000	64	15		21 18 50.04N	157 51 56.64W	2	24	11	1.9	-1.0
59	1144	64	53		21 18 47.64N	157 52 2.62W	2	35	17	-0.5	1.0
59	1444	63	17		21 18 48.78N	157 52 0.14W	2	27	12	0.0	-1.4
59	1628	63	47		21 18 47.34N	157 52 2.16W	2	35	3	-0.2	0.4
100	356	63	84		21 18 45.00N	157 51 29.44W	5	13	0	-3.2	-32.1
100	646	42	21		21 18 47.32N	157 52 0.14W	2	21	4	-0.4	-1.4
100	832	42	38		21 18 46.08N	157 52 4.50W	2	27	5	-2.1	3.0
100	1056	64	62		21 18 45.48N	157 52 1.04W	2	33	16	-2.7	-0.5

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1A-1

R/V MAHI 1970 POSITIONAL DATA, HONOLULU, HAWAII
AT PIER 18, STARBOARD SIDE TO DOCK

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
100	1244	64	13		21 18 40.52N	157 52 2.16W	2	20	9	1.4	0.5
100	1538	63	6		21 18 45.78N	157 52 1.44W	3	35	0	1.3	-0.0
100	1754	64	43		21 18 45.38N	157 52 0.64W	2	34	17	1.2	-1.0
100	1934	42	17		21 18 46.38N	157 52 2.62W	2	18	5	-1.8	1.0
100	2018	42	50		21 18 47.68N	157 52 1.84W	2	34	16	-0.5	0.3
101	1922	42	56		21 18 40.26N	157 52 0.42W	2	30	1	1.0	-1.1
101	2118	42	14		21 18 45.64N	157 52 2.04W	2	20	2	-2.0	0.5
101	2156	64	18		21 18 48.62N	157 51 56.64W	2	24	0	0.2	-3.0
101	2342	64	43		21 18 47.46N	157 52 2.24W	2	31	13	-0.8	0.7
102	404	63	66		21 18 46.60N	157 52 3.30W	2	19	1	-1.4	1.9
102	534	64	71		21 18 43.26N	157 52 3.60W	2	33	1	1.0	2.1
102	644	42	24		21 18 45.38N	157 51 56.64W	2	22	2	-2.3	-2.3
102	640	42	34		21 18 48.60N	157 52 1.74W	2	21	7	-0.2	0.2
102	1127	64	67		21 18 45.64N	157 51 36.64W	5	34	16	-2.4	-32.0
102	1406	63	0		21 18 46.38N	157 52 2.04W	2	12	6	1.2	0.6
102	1548	63	80		21 18 48.64N	157 52 2.24W	3	33	1	0.6	0.7
102	1656	64	57		21 18 48.78N	157 52 1.74W	2	34	17	0.6	0.2
102	1930	42	14		21 18 40.36N	157 52 0.64W	2	23	0	0.1	-1.0
102	1948	63	14		21 18 50.08N	157 52 2.84W	3	17	7	2.7	1.1
102	2014	42	6		21 18 47.16N	157 52 2.40W	2	34	17	-1.1	0.9
102	2254	64	70		21 18 48.16N	157 52 1.34W	2	32	0	0.1	-0.2
103	44	64	10		21 18 51.72N	157 52 0.64W	6	12	2	3.3	-0.3
103	212	63	46		21 18 47.54N	157 52 1.64W	2	26	4	-2.3	-0.3
103	444	64	41		21 18 48.42N	157 52 0.64W	2	32	16	0.2	0.2
103	612	64	63		21 18 40.66N	157 52 2.40W	2	25	12	1.6	0.0
103	734	42	76		21 18 45.64N	157 51 56.34W	2	34	0	-2.6	-2.2
103	1018	64	34		21 18 47.40N	157 52 0.72W	2	31	0	-0.9	-0.8
103	1522	42	62		21 18 48.18N	157 52 0.64W	2	25	9	-0.0	-0.9
103	2108	42	12		21 18 44.34N	157 52 4.02W	3	18	2	-3.9	2.6
111	1508	42	64		21 18 45.48N	157 52 36.74W	2	23	0	-2.7	37.2
111	2244	64	59		21 18 48.64N	157 52 1.34W	2	16	0	0.3	-0.2
112	300	63	64		21 18 51.64N	157 51 56.24W	2	17	0	3.3	-4.7
112	410	64	45		21 18 48.60N	157 52 2.24W	2	23	0	0.4	0.7
112	448	63	8		21 18 46.60N	157 52 2.04W	2	30	3	-1.4	0.7
112	626	42	32		21 18 44.62N	157 52 1.04W	2	30	3	-1.6	-2.5
112	818	42	20		21 18 47.10N	157 52 6.24W	2	12	1	-1.1	4.7
112	1028	64	63		21 18 50.22N	157 52 0.04W	2	28	7	2.0	-1.5
112	1156	64	12		21 18 41.62N	157 51 56.58W	6	13	3	-6.7	-5.0
112	1446	63	64		21 18 49.42N	157 52 0.96W	2	31	0	0.2	-0.6
112	1524	64	23		21 18 50.34N	157 52 0.64W	2	24	11	2.1	-0.6
112	1718	64	38		21 18 51.04N	157 52 3.34W	2	31	14	1.8	1.4
112	1816	42	31		21 18 49.66N	157 52 1.38W	2	23	9	0.7	-0.2

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1B-1

ARITHMETIC MEAN SOLUTION AT HONOLULU, PIER 18

NE	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
86	20	66	21 18 48.21N 157 52 1.53W	1.4 1.5	0.2 0.2

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
97	248	X		
97	932	X		
97	1436	X		
97	1740		X	
97	2322			X
98	716	X	X	
99	028	X		
100	356		X	X
100	1244	X		
101	2110	X		
102	1106		X	X
102	1426	X	X	
102	1548		X	
102	1848	X		
103	44	X	X	
103	734		X	
103	2108	X		X
111	1908	X		
112	448	X		
112	1156	X	X	

TABLE 1C-1

BY SATELLITE ----- ARITHMETIC MEAN SOLUTION AT HONOLULU, PIER 18

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	20	21 18 47.53N 157 52 1.52W	1.0 1.8	0.2 0.4
54	14	21 18 47.48N 157 52 1.39W	1.1 1.7	0.3 0.4
63	14	21 18 47.49N 157 52 1.39W	1.1 1.7	0.3 0.4
64	18	21 18 47.50N 157 52 1.34W	1.0 1.5	0.2 0.4

TABLE 1A-2

R/V KANA KECKI 1972 POSITIONAL DATA, HONOLULU, HAWAII
MOORED PORT SIDE TO PIER 18 - SOUTH.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
306	52	63	11	N-E	21 18 28.44N	157 51 34.62W	3	10	1	-20.0	-26.6
306	114	65	15	N-W	21 18 47.58N	157 52 4.38W	2	20	2	-0.8	3.1
306	234	63	45	N-W	21 18 48.18N	157 52 0.66W	2	24	1	-0.2	-0.6
*306	2140	64	10	S-E	21 18 48.18N	157 52 25.60W	2	14	5	15.0	24.4
306	2244	65	21	N-E	21 18 48.00N	157 52 2.70W	1	16	3	-0.3	8.5
306	2324	64	33	S-W	21 18 49.32N	157 52 0.84W	2	20	0	0.7	-0.5
307	148	63	46	N-E	21 18 46.62N	157 52 1.20W	2	22	2	-1.0	-0.1
307	228	67	18	N-E	21 18 47.52N	157 52 1.30W	2	17	7	-0.0	0.1
307	508	67	31	N-W	21 18 47.88N	157 52 1.08W	2	26	14	-0.6	0.7
*307	544	64	6	N-W	21 18 45.56N	157 51 56.22W	3	6	1	-0.6	-5.1
*307	726	64	80	N-W	21 18 48.12N	157 51 54.74W	5	32	1	-0.3	-4.3
*307	518	64	7	N-W	21 18 57.10N	157 51 56.20W	4	20	0	8.0	-3.1
*307	1148	65	77	S-W	21 18 51.06N	157 52 20.04W	0	24	1	2.6	13.4
*307	1236	65	7	S-W	21 18 52.00N	157 52 7.00W	0	0	0	-5.6	5.7
307	1454	63	30	S-W	21 18 50.94N	157 52 0.84W	2	24	14	2.5	-0.5
307	1842	42	38	S-E	21 18 49.14N	157 52 1.00W	2	28	11	0.7	0.7
307	2018	64	17	S-W	21 18 48.04N	157 52 1.30W	2	17	8	-0.4	0.0
307	2234	64	44	S-E	21 18 48.78N	157 52 1.30W	2	30	13	0.4	0.1
308	22	64	18	S-W	21 18 50.44N	157 52 2.40W	2	21	5	2.2	1.1
308	58	63	16	N-E	21 18 46.74N	157 51 57.24W	2	12	0	-1.7	-3.9
308	124	65	9	N-W	21 18 48.36N	157 52 2.16W	2	11	1	-0.1	0.0
308	244	63	46	N-W	21 18 48.22N	157 52 1.20W	2	31	15	-1.4	-0.1
*308	820	42	26	N-W	21 18 50.82N	157 51 50.64W	4	12	1	2.4	-10.7
308	1020	64	34	N-E	21 18 47.76N	157 52 0.64W	2	21	0	-0.7	-0.4
308	1100	65	34	S-E	21 18 49.62N	157 52 0.72W	2	28	14	-1.0	-0.6
308	1236	64	26	N-W	21 18 48.44N	157 52 1.80W	2	25	3	-0.0	0.2
308	1246	65	21	S-W	21 18 50.70N	157 52 1.86W	2	25	10	0.4	0.4
308	1406	63	74	S-S	21 18 48.42N	157 52 2.42W	2	30	1	0.3	1.3
*308	1504	63	5	S-W	21 18 48.30N	157 52 3.06W	3	12	3	-0.1	1.8
308	1604	64	17	S-E	21 18 47.02N	157 51 36.06W	2	28	3	0.2	-1.4
*308	1646	42	66	S-W	21 18 50.22N	157 52 36.06W	2	28	10	1.2	-24.3
308	2144	64	15	S-E	21 18 49.62N	157 52 1.00W	2	13	3	0.0	-0.3
308	2248	65	30	N-E	21 18 48.54N	157 52 0.30W	2	30	5	0.1	-1.0
308	2328	64	52	S-W	21 18 49.26N	157 52 1.30W	2	34	15	0.8	0.1
309	36	65	28	N-W	21 18 47.72N	157 52 1.00W	2	28	14	-0.7	0.7
309	156	63	54	N-E	21 18 47.34N	157 52 0.72W	2	21	1	-0.5	-0.6
*309	342	63	10	N-W	21 18 46.84N	157 52 3.10W	4	15	7	-1.7	-2.9
*309	548	42	7	N-E	21 18 46.36N	157 51 52.86W	3	6	2	-12.1	-8.4
309	730	42	68	N-W	21 18 47.58N	157 51 54.48W	2	31	0	-0.8	-6.8
*309	822	42	7	N-W	21 18 7.00N	157 51 54.24W	4	0	0	18.7	-7.1
*309	938	64	11	N-E	21 18 50.62N	157 52 2.16W	3	9	1	2.1	0.0
*309	1014	65	11	S-E	21 18 48.78N	157 52 1.32W	4	16	7	2.4	0.0
309	1114	64	71	N-W	21 18 46.82N	157 52 1.32W	1	39	17	-1.6	0.2
309	1156	65	59	S-W	21 18 49.50N	157 52 1.62W	2	32	15	-1.1	0.1
*309	1306	64	7	N-W	21 18 55.20N	157 52 7.86W	0	0	0	6.8	6.6

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1A-2

R/V KANA KECKI 1972 POSITIONAL DATA, HONOLULU, HAWAII
MOORED PORT SIDE TO PIER 18 - SOUTH.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
309	1720	63	32	S-E	21 18 49.30N	157 52 1.20W	2	24	0	1.4	-0.1
309	1804	63	29	S-W	21 18 50.34N	157 52 0.72W	2	27	0	1.3	-0.3
312	302	63	22	N-W	21 18 46.56N	157 52 1.04W	2	25	12	-1.0	0.7
312	434	42	16	N-E	21 18 47.74N	157 52 0.84W	2	27	12	-1.2	-1.2
*312	754	64	77	N-E	21 18 44.18N	157 52 3.84W	3	34	1	-0.2	2.5
312	818	42	23	N-W	21 18 46.69N	157 52 1.22W	2	28	13	-1.7	0.0
*312	846	64	0	N-W	21 18 51.22N	157 52 1.74W	3	12	5	4.8	0.4
312	1026	64	57	N-E	21 18 47.64N	157 52 1.74W	2	35	17	-0.8	0.4
*312	1118	65	76	S-E	21 18 46.10N	157 51 59.76W	2	34	14	0.6	-1.6
312	1214	64	16	N-W	21 18 46.66N	157 52 2.16W	2	23	11	-1.3	0.0
312	1238	63	17	S-E	21 18 43.32N	157 52 0.94W	2	24	3	0.0	-0.3
*312	1306	65	8	S-W	21 18 42.10N	157 52 4.22W	2	4	2	-1.1	3.0
312	1422	63	51	S-W	21 18 45.18N	157 52 1.08W	2	36	17	1.0	-0.2
*312	1754	42	14	S-E	21 18 48.04N	157 51 50.04W	2	10	5	-0.4	-1.4
312	1824	64	38	S-E	21 18 46.60N	157 52 1.32W	2	24	7	1.1	0.0
312	1940	42	55	S-W	21 18 50.10N	157 52 1.50W	2	30	14	1.7	0.2
312	2008	64	22	S-W	21 18 50.16N	157 52 1.00W	2	23	6	1.7	-0.2
312	2150	64	26	S-E	21 18 43.08N	157 52 1.62W	2	25	3	0.7	0.3
312	2306	65	68	N-E	21 18 48.18N	157 52 1.00W	2	26	1	-0.2	-0.2
312	2336	64	30	S-W	21 18 49.62N	157 52 1.60W	2	29	4	1.2	0.2
*313	30	63	12	N-E	21 18 47.34N	157 51 59.74W	4	11	4	-0.5	-1.5
*313	56	65	11	N-W	21 18 51.48N	157 52 1.38W	2	13	0	3.1	0.1
313	212	63	57	N-W	21 18 46.32N	157 52 1.20W	2	26	0	-2.1	-0.1

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1B-2

ARITHMETIC MEAN SOLUTION AT HONOLULU, PIER 19 SOUTH

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
68	24	44	21 18 48.42N 157 52 1.30W	1.4 1.5	0.2 0.3

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
306	52	X		X
306	2140	X		X
307	544	X		
307	724		X	
307	2118	X		
307	1144		X	X
307	1336	X		
308	124	X		
308	810			X
308	1554	X		
308	1740			X
309	312	X		
309	548	X		X
309	922	X		X
309	936	X		
309	1014	X		
309	1306	X	X	
312	656		X	
312	846	X		
312	1118		X	
312	1306	X		
312	1754	X		
313	30	X		
313	56	X		

TABLE 1C-2

BY SATELLITE SET ---- ARITHMETIC MEAN SOLUTION AT HONOLULU, PIER 18 SOUTH

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	5	21 18 48.25N 157 51 59.87W	1.4 3.1	0.5 1.4
54	12	21 18 48.55N 157 52 0.70W	1.3 2.1	0.4 0.5
63	13	21 18 48.45N 157 52 0.77W	1.4 2.0	0.4 0.5
64	4	21 18 47.79N 157 51 59.46W	1.0 3.4	0.5 1.7
65	8	21 18 48.75N 157 52 0.43W	1.3 2.5	0.5 0.9
67	2	21 18 48.36N 157 51 56.23W	1.1 5.3	0.4 3.9

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TABLE 1A-3

P/V KANA KENKI 1972 POSITIONAL DATA, HONOLULU, HAWAII
MOORED PORT SIDE TO PIER 18, 38.4 METERS NORTH OF DAY 306 LOCATION.

DAY	GMT	SAT	ELEV	CECN	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
309	1850	42	42	S-E	21 18 50.16N	157 52 2.40W	2	30	14	0.2	1.4
309	2039	42	20	S-W	21 18 51.00N	157 52 1.32W	2	24	5	1.1	0.4
309	2206	54	10	N-E	21 18 47.10N	157 51 55.14W	4	9	3	-2.4	-5.4
309	2216	54	57	S-E	21 18 49.80N	157 52 2.40W	2	31	1	-0.1	1.5
309	2344	65	72	N-W	21 18 49.72N	157 52 1.20W	2	33	0	-1.2	0.3
310	24	54	13	S-W	21 18 50.74N	157 52 2.82W	2	20	0	1.0	1.9
310	128	63	24	N-E	21 18 48.96N	157 52 0.54W	2	22	5	-1.0	-0.4
310	252	63	32	N-W	21 18 50.04N	157 52 0.56W	2	27	1	0.1	0.1
310	434	42	32	N-E	21 18 48.64N	157 52 0.54W	2	31	14	-1.0	-0.4
310	656	64	54	N-E	21 18 49.68N	157 51 57.78W	2	16	1	-0.2	-3.1
310	822	42	25	N-W	21 18 49.54N	157 52 1.20W	2	23	13	-1.4	0.3
310	842	64	15	N-W	21 18 51.66N	157 51 56.84W	2	12	2	2.0	-1.2
310	1022	54	44	N-E	21 18 48.30N	157 52 1.62W	2	34	17	-1.4	0.7
310	1106	65	51	S-E	21 18 50.40N	157 52 0.54W	2	32	15	1.2	0.1
310	1214	63	11	S-E	21 18 52.26N	157 52 1.06W	2	16	8	-17.6	16.1
310	1256	65	14	S-W	21 18 52.38N	157 52 1.74W	2	19	8	2.5	0.4
310	1414	63	69	S-W	21 18 49.08N	157 52 1.50W	2	30	0	-0.8	0.6
310	1758	42	13	S-E	21 18 51.00N	157 52 2.70W	2	17	5	1.1	1.4
310	1814	64	26	S-E	21 18 51.48N	157 52 2.40W	2	25	4	1.6	1.5
310	1942	42	60	S-W	21 18 50.52N	157 52 0.84W	2	33	11	0.5	-0.1
310	2002	64	32	S-W	21 18 51.12N	157 52 1.32W	2	23	9	1.2	0.4
310	2148	54	20	S-E	21 18 50.72N	157 52 0.06W	2	16	3	0.9	-0.8
310	2256	65	44	N-E	21 18 50.68N	157 52 0.30W	2	31	7	0.7	-0.4
310	2332	54	40	S-W	21 18 51.48N	157 52 0.06W	2	30	15	1.6	0.1
311	44	65	14	N-W	21 18 48.12N	157 52 0.66W	2	26	12	-1.4	0.1
311	202	63	45	N-E	21 18 44.30N	157 51 56.16W	4	24	0	-1.5	-4.7
311	544	42	6	N-E	21 18 51.12N	157 51 56.84W	4	7	0	1.7	-1.0
311	720	64	21	N-E	21 18 50.40N	157 52 1.20W	2	22	1	0.5	0.3
311	726	42	77	N-W	21 18 49.46N	157 51 57.00W	2	30	1	-0.4	-3.0
311	746	64	41	N-W	21 18 48.12N	157 52 1.32W	2	32	4	-1.8	0.4
311	918	42	7	N-W	21 18 53.10N	157 52 7.14W	15	0	0	3.2	6.2
311	934	54	16	N-E	21 18 48.84N	157 52 2.16W	2	14	1	-1.1	1.3
311	1022	65	18	S-E	21 18 52.04N	157 52 0.42W	2	22	0	2.2	-0.5
311	1118	54	64	N-W	21 18 47.28N	157 52 1.20W	2	35	16	-2.6	0.3
311	1206	65	39	S-W	21 18 52.26N	157 52 1.74W	2	28	10	2.3	0.4
311	1326	63	46	S-E	21 18 49.68N	157 52 1.50W	2	30	4	0.1	0.6
311	1512	63	20	S-W	21 18 50.82N	157 52 1.38W	2	27	12	0.9	0.5

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1B-3

ARITHMETIC MEAN SOLUTION, HONOLULU, PIER 18, 38.4 METERS NORTH.

NP	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
37	E	29	21 18 49.52N 157 52 0.50W	1.3 1.3	0.2 0.2

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
309	2206	X		
310	24	X		
310	1234	X	X	X
310	1256	X		
310	1758	X		
311	544	X		
311	726	X	X	
311	918	X	X	

TABLE 1C-3

BY SATELLITE, MEAN SOLUTION, HONOLULU, PIER 18, 38.4 METERS NORTH.

SATELLITE NUMBER	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	5	21 18 49.84N 157 52 1.26W	1.0 0.7	0.5 0.3
54	6	21 18 49.83N 157 52 1.45W	0.9 0.8	0.4 0.3
63	6	21 18 49.83N 157 52 1.45W	0.9 0.9	0.4 0.3
64	6	21 18 49.83N 157 52 1.45W	0.9 0.8	0.4 0.3
65	6	21 18 49.83N 157 52 1.45W	0.9 0.8	0.4 0.3

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TABLE 1A-4

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R/V KANA KECKI 1972 POSITIONAL DATA, MONOLULU, HAWAII
RECORDED FOR REPAIRS AT PIER 10.

DAY	GMT	SAT	ELFV	CECM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
311	1946	42	46	S-E	21 18 27.66N	157 51 58.56W	2	28	3	-0.2	-0.4
*311	1910	64	41	S-W	21 18 28.09N	157 51 54.36W	4	28	0	0.3	-4.6
311	2036	42	18	S-W	21 18 28.62N	157 51 58.68W	3	16	0	0.8	-0.0
*311	2058	64	7	S-W	21 18 13.69N	157 52 2.82W	5	0	0	-13.9	3.8
311	2210	65	16	N-E	21 18 27.69N	157 51 57.99W	2	23	11	-0.2	-1.1
311	2240	64	46	S-E	21 18 28.26N	157 52 0.66W	2	27	0	0.4	1.7
311	2354	65	48	N-W	21 18 26.94N	157 51 58.86W	2	32	0	-0.9	-0.1
*312	28	54	9	S-W	21 18 27.66N	157 51 58.68W	2	10	0	-0.8	-0.3

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1B-4

ARITHMETIC MEAN SOLUTION AT MONOLULU, PIER 10.

NP	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
R	3	5	21 18 27.82N 157 51 58.99W	0.6 1.0	0.3 0.5

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15	ITERATIONS >5	DEVIATION >10 SECS OF ARC
311	1910	X	X	
311	2058	X		X
312	28	X		

TABLE 1C-4

BY SATELLITE -- ARITHMETIC MEAN SOLUTION AT MONOLULU, PIER 10.

SATELLITE NUMBER	N30	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	2	21 18 28.14N 157 51 58.77W	0.7 0.3	0.5 0.2
54	1	21 18 27.66N 157 51 58.56W		
65	2	21 18 28.14N 157 51 58.77W	0.7 0.3	0.5 0.2

TABLE 1A-5

R/V KANA KECKI 1973 POSITIONAL DATA, MONOLULU, HAWAII
SECURED WITH PORT SIDE TO PIER 18.

DAY	GMT	SAT	ELFV	CECM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
204	2018	65	8	S-W	21 18 51.19N	157 52 7.20W	3	9	3	2.8	-5.7
204	2210	63	15	S-W	21 18 49.78N	157 52 1.32W	2	24	5	1.6	-0.2
205	14	64	18	S-E	21 18 40.72N	157 51 58.68W	2	13	0	0.4	-0.8
205	158	64	46	S-W	21 18 42.66N	157 52 1.32W	2	32	8	1.5	-0.2
205	258	42	17	S-W	21 18 50.64N	157 52 0.66W	2	23	3	1.7	-0.8
205	414	64	63	S-E	21 18 48.42N	157 52 1.32W	2	17	1	0.1	-0.2
*205	558	54	12	S-W	21 18 47.64N	157 52 2.52W	2	18	4	-0.4	1.0
205	618	65	65	N-E	21 18 48.36N	157 52 2.70W	2	33	16	0.0	1.2
*205	610	65	10	N-W	21 18 40.66N	157 52 3.06W	2	14	6	0.3	1.6
205	1700	63	21	N-W	21 18 47.46N	157 52 1.74W	2	26	12	-0.9	0.3
*205	1202	64	14	N-E	21 18 50.58N	157 52 0.54W	3	11	1	2.2	-0.9
205	1244	64	50	N-W	21 18 47.64N	157 52 0.66W	2	34	3	-0.7	-0.8
205	1540	42	22	N-W	21 18 47.72N	157 52 1.32W	2	27	11	-0.4	-0.1
205	1600	64	40	N-E	21 18 47.62N	157 52 0.66W	2	25	7	-0.8	-0.6
205	1742	65	30	S-E	21 18 47.52N	157 51 58.56W	2	24	5	-0.8	-2.9
205	1928	65	27	S-W	21 18 49.80N	157 52 2.70W	2	27	14	1.5	1.2
205	2122	63	45	S-W	21 18 51.06N	157 52 1.50W	2	30	2	2.7	0.0
206	110	64	65	S-E	21 18 43.26N	157 52 4.38W	3	33	15	0.9	2.0
*206	258	64	11	S-W	21 18 53.15N	157 52 4.02W	2	17	8	4.9	2.5
206	320	54	22	S-E	21 18 40.66N	157 52 1.32W	2	25	11	1.3	-0.2
206	506	54	36	S-W	21 18 49.74N	157 52 0.66W	2	20	8	1.4	-0.5
206	532	65	24	N-E	21 18 40.50N	157 52 2.64W	2	28	13	1.2	1.2
206	720	65	31	N-W	21 18 47.64N	157 52 1.32W	2	24	10	-0.7	-0.1
206	928	63	68	N-W	21 18 46.74N	157 52 0.39W	2	31	12	-1.6	-1.2
206	1258	64	54	N-E	21 18 48.66N	157 52 2.52W	2	31	1	-0.3	1.0
206	1444	42	43	N-W	21 18 48.00N	157 51 5.52W	2	16	0	-0.3	-2.0
206	1508	54	17	N-E	21 18 47.34N	157 52 0.30W	2	24	11	-1.0	-1.2
206	1652	54	49	N-W	21 18 46.50N	157 52 1.20W	2	35	17	-1.8	-0.3
206	1840	65	61	S-E	21 18 45.40N	157 52 5.04W	2	26	0	-2.4	3.6
206	2032	63	46	S-E	21 18 47.64N	157 52 2.22W	2	16	0	-1.3	0.8
*206	2220	63	12	S-W	21 18 44.28N	157 52 1.20W	4	19	8	-4.1	-0.3
207	22	64	26	S-E	21 18 47.52N	157 52 2.70W	2	26	4	-0.8	1.2
207	206	42	53	S-E	21 18 48.30N	157 52 1.98W	2	19	1	-0.0	0.5

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1B-5

ARITHMETIC MEAN SOLUTION, HONOLULU, PIER 18.

NP	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
33	6	27	21 18 48.34N 157 52 1.48W	1.3 1.4	0.2 0.3

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF APC
204	2018	X		
205	558	X		
205	810	X		
205	1202	X		
206	258	X		
206	2220	X		

TABLE 1C-5

BY SATELLITE, MEAN SOLUTION, HONOLULU, PIER 18.

SATELLITE NUMBER	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	4	21 18 48.51N 157 52 0.83W	1.0 1.1	0.5 0.5
54	6	21 18 48.33N 157 52 0.95W	0.9 0.8	0.4 0.3
63	5	21 18 48.49N 157 52 0.97W	0.9 0.9	0.4 0.4
64	6	21 18 48.33N 157 52 0.95W	0.9 0.8	0.4 0.3
65	7	21 18 48.52N 157 52 1.00W	1.0 0.8	0.4 0.3

TABLE 1A-6

R/V KANA KEDKI 1973 POSITIONAL DATA, HONOLULU, HAWAII
EIGHT SIDE TO PIER 18, ANTENNA 20.7 METERS NORTH OF S. END OF PIER.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS2	DEVIATION FROM THE MEAN (IN SECONDS OF ARC) LATITUDE LONGITUDE
*221	1044	42	28	N-E	21 18 48.69N	157 51 57.00W	2	25	8	-1.7 -3.8
*221	1202	64	8	N-W	21 18 48.90N	157 51 57.00W	3	10	4	6.2 -3.4
*221	1230	42	29	N-W	21 18 47.40N	157 52 2.04W	2	28	14	-1.3 0.3
*221	1350	54	40	N-W	21 18 47.53N	157 52 1.32W	2	32	15	-1.1 -0.4
*221	1422	65	22	S-E	21 18 50.34N	157 52 2.52W	2	31	14	1.6 0.8
*221	1608	65	44	S-W	21 18 49.02N	157 52 1.20W	2	37	18	1.2 -0.5
*221	1730	63	60	S-E	21 18 48.35N	157 52 3.72W	2	27	0	-0.3 2.0
*221	1818	63	10	S-W	21 18 43.14N	157 52 1.74W	2	13	3	0.4 0.0
*221	2136	64	39	S-E	21 18 48.54N	157 52 1.62W	2	30	3	-0.2 -0.1
*221	2205	42	10	S-E	21 18 50.76N	157 51 57.72W	3	9	1	-3.0 -3.0
*221	2322	64	21	S-W	21 18 48.66N	157 52 1.33W	2	25	10	0.3 -0.3
*221	2350	42	65	S-W	21 18 48.24N	157 52 0.84W	2	30	0	-0.5 -0.0
*222	112	54	69	S-W	21 18 47.88N	157 52 1.31W	12	0	0	-0.8 -3.3
*222	302	54	7	S-W	21 18 31.24N	157 52 4.02W	3	0	0	-15.5 2.3
*222	356	65	51	N-W	21 18 47.34N	157 52 2.82W	2	28	1	-1.4 1.1
*222	516	63	50	N-E	21 18 48.48N	157 52 1.55W	2	13	2	-0.2 -0.2
*222	706	63	18	N-W	21 18 47.40N	157 52 1.50W	2	21	1	-1.3 -0.2
*222	824	64	31	N-E	21 18 48.19N	157 52 1.62W	2	26	1	0.7 -0.1
*222	954	42	7	N-E	21 18 44.74N	157 52 4.02W	4	4	1	6.4 2.3
*222	1112	64	27	N-W	21 18 48.24N	157 52 2.44W	2	29	14	-0.5 0.0
*222	1139	42	78	N-W	21 18 46.68N	157 52 24.48W	2	24	1	-2.6 22.8
*222	1258	54	69	N-E	21 18 48.72N	157 52 3.30W	2	31	0	0.0 1.4
*222	1326	42	7	N-W	21 18 9.12N	157 51 52.24W	2	0	0	20.4 -0.4
*222	1448	54	9	N-W	21 18 50.82N	157 52 1.52W	2	11	0	2.1 -0.2
*222	1520	65	71	S-E	21 18 49.73N	157 52 3.64W	2	35	1	0.0 2.1
*222	1742	63	22	S-E	21 18 43.44N	157 52 1.66W	2	27	12	0.7 0.2
*222	1708	65	11	S-W	21 18 47.58N	157 52 2.16W	2	19	8	-1.1 0.5
*222	1838	63	36	S-W	21 18 42.28N	157 52 1.74W	2	31	15	0.5 0.0
*222	2046	64	14	S-E	21 18 48.60N	157 52 1.20W	2	13	0	-3.7 -0.5
223	20	54	38	S-E	21 18 43.60N	157 52 2.40W	2	28	3	-0.1 0.7
223	42	42	20	S-W	21 18 42.02N	157 52 1.33W	2	18	5	3.3 -0.3
223	208	54	24	S-W	21 18 51.42N	157 52 4.02W	2	27	0	2.7 3.2
223	306	65	62	N-E	21 18 49.13N	157 52 0.64W	2	34	17	-0.5 -1.0
223	430	63	19	N-E	21 18 48.72N	157 52 2.52W	2	24	6	0.0 0.8
*223	456	65	12	N-W	21 18 45.35N	157 52 2.16W	2	16	2	-3.3 0.5
223	616	61	47	N-W	21 18 47.29N	157 52 1.84W	2	34	16	-1.4 0.2
*223	838	64	10	N-E	21 18 51.60N	157 52 1.03W	5	12	4	-2.0 -0.6
223	1020	64	60	N-W	21 18 47.94N	157 52 0.04W	2	33	0	-0.8 -1.6
223	1040	42	11	N-E	21 18 47.84N	157 52 0.30W	2	31	14	-0.8 -1.4
223	1218	54	23	N-E	21 18 48.00N	157 51 58.74W	2	13	0	0.2 -1.0
223	1228	42	27	N-W	21 18 47.64N	157 52 2.16W	2	29	14	-1.1 0.5
223	1354	54	11	N-W	21 18 47.64N	157 52 1.32W	2	30	14	-1.1 -0.4
223	1432	65	32	S-E	21 18 50.16N	157 52 2.64W	2	33	15	1.5 0.7
223	1618	65	21	S-W	21 18 49.68N	157 52 0.64W	2	34	16	1.3 -1.2
*223	1738	63	68	S-E	21 18 48.96N	157 52 11.64W	2	29	0	0.3 10.2

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

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TABLE 1B-6

ARITHMETIC MEAN SOLUTION, HONOLULU, PIER 18, ANT. 20.7 METERS NORTH.

NP	N	ASC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
45	14	31	21 18 48.70N 157 52 1.70W	1.2 1.4	0.2 0.3

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
251	1202	X		
251	1218	X		
251	2206	X		
252	1112		X	
252	1022	X		X
252	0654	X		
252	1138		X	X
252	1326	X		X
252	1448	X		
252	1708	X		
252	2048	X		
253	456	X		
253	838	X	X	
253	1738			X

TABLE 1C-6

BY SATELLITE, MEAN SOLUTION, HONOLULU, PIER 18, ANT. 20.7 METERS NORTH.

SATELLITE NUMBER	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	6	21 18 48.36N 157 52 0.77W	1.8 1.6	0.8 0.6
54	6	21 18 48.36N 157 52 0.77W	1.8 1.6	0.8 0.6
63	7	21 18 48.25N 157 52 0.85W	1.7 1.5	0.6 0.5
64	5	21 18 48.50N 157 52 0.49W	2.0 1.6	0.9 0.7
65	7	21 18 48.25N 157 52 0.85W	1.7 1.5	0.6 0.5

TABLE 1A-7

R/V KANA KEOKI 1973 POSITIONAL DATA, HONOLULU, HAWAII
PORT SIDE TO PIER 18, ANTENNA 14.6 METERS NORTH OF S. END OF PIER.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	LATITUDE	LONGITUDE
290	144	65	40	N-W	21 18 46.68N	157 52 0.70W	3	36	17	-1.5	-1.3	
290	244	63	35	N-E	21 18 46.72N	157 52 0.18W	2	14	1	0.5	-1.4	
290	426	63	20	N-W	21 18 47.08N	157 52 0.10W	2	19	2	0.3	-1.4	
290	700	64	39	N-E	21 18 48.60N	157 52 2.04W	2	31	1	0.4	0.5	
290	840	42	49	N-E	21 18 47.52N	157 52 1.74W	2	34	16	-0.6	0.2	
290	1024	42	16	N-W	21 18 47.92N	157 52 2.16W	2	23	10	-0.3	0.6	
290	1208	65	75	S-W	21 18 47.28N	157 51 55.20W	2	22	1	-0.7	-1.4	
290	1404	63	44	S-E	21 18 47.04N	157 52 0.30W	2	18	1	-1.1	-1.7	
290	1548	63	48	S-W	21 18 47.74N	157 51 55.10W	2	28	4	1.6	-2.5	
290	1824	64	19	S-E	21 18 48.38N	157 52 2.64W	2	25	9	1.2	0.5	
290	2002	42	21	S-E	21 18 48.50N	157 52 2.40W	2	22	5	1.3	0.8	
290	2146	42	38	S-W	21 18 48.90N	157 51 54.72W	3	16	0	0.7	-6.8	
290	2314	65	6	N-E	21 18 51.72N	157 51 55.84W	6	9	2	3.6	-3.1	
290	2346	64	16	S-W	21 18 50.16N	157 52 1.20W	2	23	11	2.0	-0.4	
291	54	65	71	N-E	21 18 52.46N	157 49 55.08W	3	31	0	11.3	-126.5	
291	244	65	9	N-W	21 18 44.54N	157 52 0.06W	2	0	0	0.4	-1.5	
291	340	63	54	N-W	21 18 46.62N	157 52 4.26W	2	26	8	-1.5	2.7	
291	612	64	14	N-E	21 18 45.72N	157 52 1.20W	2	21	10	-2.4	-0.4	
291	748	42	15	N-E	21 18 47.40N	157 51 55.74W	2	22	10	-0.3	-2.8	
291	804	64	56	N-W	21 18 45.74N	157 52 2.16W	2	17	0	-1.4	0.4	
291	930	42	50	N-W	21 18 47.64N	157 52 0.54W	2	22	12	-0.5	-1.0	
291	950	64	39	N-E	21 18 48.24N	157 52 0.74W	2	22	6	0.1	-1.0	
291	1132	64	21	N-W	21 18 46.44N	157 52 2.04W	2	27	12	-1.7	0.5	
291	1220	65	32	S-E	21 18 48.06N	157 52 2.70W	2	31	14	-0.1	1.1	
291	1406	65	18	S-W	21 18 48.18N	157 52 1.32W	2	23	10	0.0	-3.2	
291	1532	63	69	S-E	21 18 48.40N	157 52 1.74W	3	26	0	0.4	0.2	
291	154	63	14	N-E	21 18 48.72N	157 52 0.18W	2	10	0	-2.4	-1.4	
291	1920	64	71	S-E	21 18 48.78N	157 52 3.14W	2	31	0	0.6	1.6	
291	2052	42	67	S-E	21 18 49.14N	157 52 5.53W	2	23	0	1.0	4.0	
291	1646	63	12	S-W	21 18 31.68N	157 51 52.62W	4	5	1	-15.5	-9.6	
291	2240	42	17	S-W	21 18 50.04N	157 52 1.50W	6	15	7	2.8	-0.1	
291	2256	64	45	S-W	21 18 49.38N	157 52 1.74W	2	26	11	1.2	0.2	
292	4	65	37	N-E	21 18 47.16N	157 52 1.65W	2	30	3	-1.0	0.3	
292	154	65	27	N-W	21 18 47.64N	157 52 0.66W	2	32	5	-0.6	-0.6	
292	246	63	57	N-E	21 18 45.42N	157 52 3.14W	3	17	1	0.3	1.4	
292	436	63	13	N-W	21 18 47.08N	157 52 5.10W	3	11	1	-8.1	7.7	
292	708	64	56	N-E	21 18 47.82N	157 52 2.52W	2	29	0	-0.3	1.0	
292	836	42	54	N-E	21 18 47.46N	157 52 1.86W	2	33	15	-0.7	0.3	
292	1024	42	14	N-W	21 18 47.16N	157 52 2.16W	2	21	9	-1.0	0.6	
292	1042	64	55	N-W	21 18 46.58N	157 52 1.62W	2	30	14	-1.2	0.1	
292	1134	65	13	S-E	21 18 49.02N	157 52 2.70W	2	15	8	0.3	1.1	
292	1318	65	52	S-W	21 18 48.36N	157 52 0.06W	2	32	15	0.2	-1.5	
292	1414	63	26	S-E	21 18 47.46N	157 52 0.84W	2	14	0	-0.7	-0.7	
292	1558	63	31	S-W	21 18 50.34N	157 52 1.98W	2	25	0	2.2	3.4	
292	1822	64	28	S-E	21 18 49.14N	157 52 2.64W	2	26	5	1.0	1.1	
292	1556	42	23	S-E	21 18 48.36N	157 52 2.28W	2	19	0	0.2	0.7	

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1A-7 (CONT.)

R/V KANA KEOKI 1973 POSITIONAL DATA. HONOLULU, HAWAII
PCRT SIDE TO PIER 18, ANTENNA 14.6 METERS NORTH OF S. END OF PIER.

DAY	GMT	SAT	ELEV	GFCM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
292	2015	64	31	S-W	21 18 49.02N	157 52 1.32W	2	19	2	1.4	-0.2
292	2142	42	34	S-W	21 18 49.02N	157 52 0.84W	2	32	15	1.5	-0.7
292	2202	54	65	S-E	21 18 49.14N	157 52 1.02W	3	24	0	1.0	0.4
292	2250	54	11	S-W	21 18 46.62N	157 52 6.35W	4	15	1	-1.5	4.4
293	202	63	21	N-E	21 18 56.16N	157 53 31.39W	2	24	10	0.0	0.0
293	206	43	30	N-W	21 18 46.66N	157 52 1.85W	2	19	1	-2.5	0.3
293	220	64	22	N-E	21 19 1.02N	157 51 54.60W	2	27	13	13.4	-7.0
293	244	42	17	N-E	21 18 46.10N	157 52 0.42W	2	20	1	0.4	-1.1
293	206	64	39	N-W	21 18 46.20N	157 52 0.65W	2	32	13	-2.0	-0.5
293	230	42	46	N-W	21 18 46.62N	157 52 1.74W	2	26	11	-1.5	0.2
293	248	64	51	N-E	21 18 47.62N	157 52 2.25W	2	35	17	-0.6	0.7
293	1136	54	16	N-W	21 18 46.38N	157 52 2.15W	2	23	11	-1.9	0.6
293	1230	65	59	S-E	21 18 49.02N	157 52 4.02W	2	31	14	0.0	2.5
293	1374	63	8	S-E	21 18 46.72N	157 52 6.88W	4	5	1	0.5	7.3
293	1419	65	11	S-W	21 18 50.46N	157 52 1.66W	3	15	7	2.3	0.3
293	1630	63	82	S-W	21 18 46.14N	157 52 5.04W	6	30	2	0.0	1.5
293	1930	64	79	S-W	21 18 49.02N	157 52 0.30W	2	33	1	0.7	-1.1
293	2044	42	64	S-E	21 18 49.20N	157 52 1.04W	2	26	0	1.1	0.4
293	2112	54	25	S-E	21 18 49.96N	157 52 2.84W	2	18	3	1.7	2.3
293	2234	42	9	S-W	21 18 43.26N	157 52 3.30W	7	12	5	-4.3	1.7
293	2258	54	34	S-W	21 18 50.34N	157 52 1.50W	2	30	1	2.2	-0.1
294	16	65	53	N-E	21 18 48.24N	157 52 3.30W	2	34	13	0.1	1.7
294	206	65	19	N-W	21 18 46.00N	157 52 2.04W	2	28	13	-2.7	0.5
294	256	67	79	N-E	21 18 48.00N	157 52 1.20W	5	27	4	0.7	-0.4
294	446	63	6	N-W	21 33 6.06N	157 48 4.32W	8	6	0	85.8	-217.2
294	718	64	73	N-E	21 18 47.64N	157 52 6.54W	4	32	1	-0.5	5.0
294	832	42	59	N-E	21 18 47.52N	157 52 1.86W	2	32	15	-0.6	0.3
294	856	64	18	N-E	21 18 46.56N	157 51 50.40W	2	25	11	-1.6	-2.2
294	1020	42	15	N-W	21 18 46.02N	157 52 2.70W	2	18	6	-1.2	1.1
294	1044	64	48	N-W	21 18 47.74N	157 52 0.64W	2	32	0	-1.4	0.3
294	1142	65	21	S-E	21 18 49.02N	157 52 1.62W	2	25	11	0.0	0.1
294	1228	65	33	S-W	21 18 49.62N	157 52 0.0 W	2	29	13	1.5	-1.5
294	1420	63	38	S-F	21 18 47.16N	157 52 1.32W	2	14	0	-1.0	-0.2
294	1626	63	22	S-W	21 18 51.00N	157 51 54.60W	2	24	7	2.8	-7.0
294	1842	64	40	S-E	21 18 49.08N	157 52 1.34W	2	30	7	0.9	-0.2
294	1952	42	25	S-E	21 18 49.32N	157 52 0.64W	2	27	3	1.2	-1.0
294	2022	54	7	S-E	21 18 51.38N	157 51 50.04W	14	0	0	-16.8	-10.6
294	2138	42	33	S-W	21 18 50.10N	157 52 1.62W	2	31	15	1.9	0.1
294	2206	54	73	S-E	21 18 49.14N	157 52 15.48W	9	30	0	1.0	13.3
294	2330	65	21	N-E	21 18 46.54N	157 52 2.04W	2	28	11	-2.4	0.5
294	2354	54	7	S-W	21 18 45.24N	157 52 4.26W	2	7	3	-2.3	2.7
295	114	65	47	N-W	21 18 46.50N	157 52 0.0 W	2	36	17	-1.7	-1.7
295	208	63	30	N-E	21 18 47.24N	157 52 1.09W	2	19	3	-0.9	0.4
295	258	61	26	N-W	21 18 52.52N	157 52 1.62W	2	13	1	4.8	0.1
295	630	64	32	N-F	21 18 47.58N	157 52 1.32W	2	30	14	-0.6	-0.2
295	738	42	19	N-F	21 18 46.92N	157 52 0.84W	2	24	4	-1.2	-0.7

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1A-7 (CONT.)

R/V KANA KEOKI 1973 POSITIONAL DATA. HONOLULU, HAWAII
PCRT SIDE TO PIER 18, ANTENNA 14.6 METERS NORTH OF S. END OF PIER.

DAY	GMT	SAT	ELEV	GFCM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
295	616	64	24	N-W	21 18 46.80N	157 52 1.32W	2	28	14	-1.4	-0.2
295	622	42	42	N-W	21 18 46.74N	157 52 0.64W	2	33	16	-1.4	-0.6
295	652	54	66	N-E	21 18 48.24N	157 52 0.18W	2	34	0	0.1	-1.4
295	1140	54	11	N-W	21 18 46.44N	157 52 3.18W	3	17	7	-1.7	1.6
295	1240	65	79	S-E	21 18 49.68N	157 52 22.80W	3	30	1	1.8	21.2
295	1314	63	13	S-E	21 18 52.02N	157 52 13.50W	2	16	2	9.4	11.0
295	1428	65	7	S-W	21 18 47.40N	157 52 6.74W	2	0	0	-10.7	5.7
295	1518	63	58	S-E	21 18 49.32N	157 52 3.48W	2	42	4	1.5	1.0
295	1714	64	15	S-E	21 18 51.35N	157 52 0.04W	2	18	4	3.2	0.5
295	1838	64	54	S-W	21 18 49.00N	157 52 0.64W	2	33	0	0.7	-0.7
295	2044	42	57	S-F	21 18 47.14N	157 52 5.20W	3	25	0	1.0	3.7
296	544	64	11	N-E	21 18 51.48N	157 52 1.38W	3	16	7	3.3	-0.2
296	728	64	54	N-W	21 18 47.40N	157 52 1.32W	2	27	1	-0.8	0.4
296	828	42	61	N-E	21 18 47.46N	157 52 1.32W	2	27	0	-0.7	-0.2
296	904	54	24	N-E	21 18 47.10N	157 52 0.18W	2	24	1	-1.1	-1.4
296	1016	42	11	N-W	21 18 44.04N	157 52 1.38W	6	17	9	0.8	-0.2
296	1048	54	35	N-W	21 18 46.69N	157 52 2.16W	2	33	16	-1.5	0.6
296	1152	65	31	S-E	21 18 48.64N	157 52 2.64W	2	29	13	0.8	1.1
296	1238	65	22	S-W	21 18 49.72N	157 52 1.24W	3	25	11	0.9	-0.5
296	1428	63	46	S-E	21 18 49.66N	157 52 3.72W	2	19	0	0.5	2.2
296	1850	64	50	S-E	21 18 45.26N	157 52 2.64W	3	27	0	1.1	1.1
296	1950	42	29	S-E	21 18 46.50N	157 52 5.70W	2	14	3	-1.7	4.2
296	2026	54	10	S-E	21 18 45.00N	157 51 57.54W	3	13	2	-3.2	-4.0
296	2032	64	14	S-W	21 18 47.04N	157 52 0.0 W	3	14	4	-1.1	-1.6
296	2136	42	30	S-W	21 18 47.32N	157 52 0.54W	2	26	14	-1.2	-1.0
296	2210	54	83	S-E	21 18 47.76N	157 51 6.48W	2	20	0	-0.4	-5.1
296	2340	65	11	N-F	21 18 46.48N	157 52 0.64W	2	27	2	-1.7	-0.4
296	2400	54	7	S-W	21 18 21.54N	157 52 6.48W	6	0	0	-26.6	4.0
297	126	65	33	N-W	21 18 46.10N	157 52 0.18W	2	30	0	-1.0	-1.4
297	220	63	43	N-E	21 18 49.70N	157 52 2.24W	2	18	2	0.7	0.7
297	404	63	18	N-W	21 18 46.02N	157 52 1.38W	2	24	11	-1.2	-0.2
297	638	64	46	N-E	21 18 47.10N	157 52 1.20W	2	25	2	-1.1	-0.6
297	736	42	21	N-E	21 18 47.16N	157 52 0.04W	2	26	12	-1.0	-0.4
297	814	54	7	N-E	21 18 52.06N	157 51 50.38W	2	0	0	3.0	-2.4
297	826	64	18	N-W	21 18 46.64N	157 52 2.04W	2	21	4	-1.7	0.5
297	920	42	16	N-W	21 18 46.68N	157 52 2.04W	2	33	16	-1.2	0.5
297	956	54	78	N-E	21 18 47.28N	157 52 2.77W	2	34	1	-1.9	0.1
297	1106	65	10	S-E	21 18 47.10N	157 52 1.04W	2	13	5	-1.1	0.1
297	1146	54	7	N-W	21 18 51.60N	157 51 50.34W	4	6	3	3.4	-2.2
297	1250	65	62	S-W	21 18 48.48N	157 51 50.10W	2	31	15	0.3	-2.5
297	1340	63	20	S-E	21 18 51.84N	157 52 4.02W	4	20	5	3.7	2.5
297	1526	63	41	S-W	21 18 50.62N	157 52 1.32W	2	23	1	2.4	-0.2
297	1872	64	22	S-E	21 18 49.38N	157 52 2.16W	2	26	7	1.2	0.6
297	1948	64	36	S-W	21 18 49.62N	157 52 1.80W	2	31	10	-0.5	-0.1
297	2040	42	70	S-E	21 18 47.64N	157 52 5.88W	9	0	0	-0.2	1.3
297	2118	54	42	S-E	21 18 47.64N	157 52 2.04W	2	32	15	-0.5	0.5

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1B-7

ARITHMETIC MEAN SOLUTION, HONOLULU, PIER 18, ANT. 14.6 METERS NORTH.

NP	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
138	37	101	21 18 48.17N 157 52 1.56W	1.5 1.9	0.1 0.2

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
290	2314	X	X	
291	54			X
291	244	X	X	
291	612	X		
291	154	X		X
291	1648	X		X
291	2240		X	
292	434	X		
292	1724	X		
292	1134	X		
292	2350	X		
293	202			X
293	620			X
293	1324	X		
293	1418	X		
293	1508		X	
293	1530		X	
293	2234	X	X	
294	256	X	X	
294	448	X	X	X
294	2222	X	X	X
294	2205		X	
294	2354	X		
295	1140	X		
295	1240	X		
295	1334	X		X
295	1428	X		X
296	544	X		
296	1716	X	X	
296	2025	X		
296	2042	X		
296	2400	X	X	X
297	814	X		
297	956	X	X	
297	1106	X		
297	1146	X	X	
297	2040	X	X	

TABLE 1C-7

BY SATELLITE, MEAN SOLUTION, HONOLULU, PIER 18, ANT. 14.6 METERS NORTH.

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	25	21 18 48.00N 157 52 1.74W	1.2 2.6	0.2 0.4
54	17	21 18 48.22N 157 52 1.28W	1.3 2.2	0.1 0.5
63	20	21 18 48.17N 157 52 1.44W	1.3 2.2	0.3 0.5
64	20	21 18 48.13N 157 52 1.44W	1.3 2.2	0.3 0.5
65	19	21 18 48.08N 157 52 1.24W	1.3 2.1	0.3 0.5

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TABLE 1A-8

R/V KANA KEOKI 1973 POSITIONAL DATA, HONOLULU, HAWAII
SECURED WITH PORT SIDE TO PIER 18, ANTENNA HEIGHT +19.0 METERS.

83

DAY	GMT	SAT	ELEV	GCOM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
353	350	44	50	N-W	21 18 46.80N	157 52 1.50W	3	35	16	-1.4	0.0
353	410	42	25	N-E	21 18 47.76N	157 52 1.62W	2	20	7	-0.4	0.1
353	436	54	13	N-E	21 18 46.68N	157 52 1.08W	3	16	4	-1.5	-0.4
353	552	42	34	N-W	21 18 46.62N	157 52 2.04W	2	32	15	-1.6	0.6
353	620	54	61	N-W	21 18 46.58N	157 52 1.32W	2	34	0	-1.2	-0.2
353	612	54	7	N-W	21 18 36.42N	157 52 1.22W	4	0	0	-11.8	11.8
353	632	65	50	S-E	21 18 45.90N	157 52 2.64W	2	33	15	0.7	11.2
353	1018	65	14	S-W	21 18 45.32N	157 52 1.38W	2	24	12	1.1	-0.1
353	1038	63	38	S-E	21 18 45.62N	157 52 1.42W	5	14	1	1.7	12.8
353	1116	65	43	N-E	21 18 45.78N	157 52 2.16W	2	35	16	-2.4	0.7
353	1216	63	21	S-W	21 18 40.62N	157 52 1.08W	2	27	12	1.7	-0.4
353	1202	65	21	N-W	21 18 44.16N	157 52 1.62W	2	29	13	-4.0	0.1
353	1514	64	80	S-F	21 18 48.54N	157 52 2.04W	3	29	0	0.3	3.2
353	1702	64	8	S-W	21 18 45.66N	157 52 0.66W	3	5	0	-3.1	-2.4
353	1718	62	77	S-W	21 18 48.24N	157 52 1.56W	3	0	0	0.0	0.5
353	1742	54	50	S-E	21 18 43.44N	157 52 1.56W	2	24	0	1.2	7.5
353	1800	42	7	S-W	21 18 35.40N	157 52 0.60W	3	0	0	-12.9	0.6
353	1930	54	11	S-W	21 18 51.12N	157 52 2.28W	3	15	2	2.9	0.0
353	2020	45	42	N-E	21 18 47.10N	157 52 1.50W	2	28	2	-1.1	-3.7
353	2228	65	15	N-W	21 18 44.52N	157 52 1.62W	2	21	10	-3.7	-1.3
353	2234	65	12	S-E	21 18 46.34N	157 52 0.14W	2	14	5	-1.4	
354	6	63	26	N-W	21 18 47.64N	157 52 2.04W	2	28	3	-0.6	1.5
354	302	64	65	N-E	21 18 47.62N	157 52 1.24W	2	33	4	-0.7	-0.1
354	450	64	12	N-W	21 18 48.00N	157 52 0.72W	2	19	4	0.7	-0.4
354	528	54	49	N-E	21 18 47.10N	157 52 2.16W	2	32	6	-1.1	0.5
354	644	42	8	N-W	21 18 45.68N	157 52 1.08W	3	9	3	-2.7	0.7
354	714	54	16	N-W	21 18 45.16N	157 52 2.16W	2	24	11	-0.1	0.4
354	744	65	23	S-E	21 18 40.74N	157 52 1.84W	2	30	15	1.5	0.0
354	828	65	42	S-W	21 18 40.62N	157 52 1.50W	2	36	14	1.7	-1.2
354	1012	65	10	N-E	21 18 50.82N	157 52 0.30W	2	12	0	2.6	0.6
354	1126	63	55	S-W	21 18 43.38N	157 52 2.04W	2	35	17	1.2	-1.6
354	1154	60	77	N-W	21 18 46.62N	157 52 0.66W	7	35	1	7.4	-0.3
354	1244	65	7	N-W	21 18 45.62N	157 52 0.30W	7	0	0	0.0	-0.1
354	1424	64	31	S-E	21 18 40.66N	157 52 1.20W	2	20	14	0.6	-0.2
354	1612	64	27	S-W	21 18 43.00N	157 52 1.62W	2	30	13	0.7	-0.2
354	1652	54	23	S-E	21 18 43.62N	157 52 1.32W	2	26	11	1.7	0.1
354	1804	42	23	S-W	21 18 43.60N	157 52 1.98W	2	27	13	1.3	-0.2
354	1938	54	35	S-W	21 18 50.28N	157 52 1.50W	2	30	15	2.1	-0.8
354	1936	65	15	N-E	21 18 45.32N	157 52 0.66W	2	14	2	1.1	-1.1
354	2118	65	45	N-E	21 18 45.76N	157 52 0.42W	2	31	14	-2.4	1.0
354	2310	65	35	S-E	21 18 49.02N	157 52 2.52W	2	29	13	0.8	
355	56	65	18	S-W	21 18 42.26N	157 52 1.38W	2	21	9	1.1	-0.1
355	214	64	25	N-E	21 18 47.64N	157 52 1.20W	2	23	4	-1.2	-0.3
355	400	64	34	N-W	21 18 46.86N	157 52 1.62W	2	31	5	-1.3	0.1
355	438	54	17	N-E	21 18 47.40N	157 52 0.62W	2	24	11	-0.8	0.1
355	548	42	31	N-W	21 18 46.62N	157 52 1.32W	2	28	3	-1.6	-0.2

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1A-8

R/V KANA KEOKI 1973 POSITIONAL DATA, HONOLULU, HAWAII
SECURED WITH PORT SIDE TO PIER 18, ANTENNA HEIGHT +19.0 METERS.

DAY	GMT	SAT	ELEV	GCOM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
355	622	54	47	N-W	21 18 44.92N	157 52 0.64W	2	33	16	-1.3	-0.5
355	840	45	71	S-F	21 18 40.20N	157 52 4.60W	5	33	0	1.0	3.0
355	1028	65	10	S-W	21 18 45.06N	157 52 2.16W	6	16	7	-3.1	0.7
355	1046	63	36	S-E	21 18 45.28N	157 52 23.62W	16	0	0	8.1	22.3
355	1226	63	14	S-W	21 18 49.74N	157 52 1.32W	2	21	9	1.5	-0.2
355	1318	64	10	S-E	21 18 50.04N	157 52 0.42W	2	14	4	1.4	-1.1
355	1522	44	70	S-W	21 18 48.54N	157 52 1.52W	2	24	0	0.1	0.1
355	1708	42	72	S-W	21 18 48.72N	157 51 55.22W	2	32	1	0.5	-2.3
355	1746	54	68	S-E	21 18 48.84N	157 51 56.74W	4	21	0	0.4	-2.7
355	1856	42	7	S-W	21 18 37.66N	157 52 7.86W	3	0	0	-8.5	6.4
355	1934	54	7	S-W	21 18 41.62N	157 52 4.02W	3	6	2	-5.2	2.5
355	2030	65	44	N-E	21 18 47.52N	157 52 0.66W	2	29	1	-0.7	-2.4
355	2218	65	5	N-W	21 18 52.44N	157 51 59.34W	3	11	5	4.5	-2.1
355	2348	65	77	S-W	21 18 47.52N	157 51 54.36W	3	30	0	-0.7	-7.1
356	16	63	19	N-W	21 18 47.68N	157 52 2.16W	2	23	11	-0.3	0.7
356	310	64	73	N-W	21 18 48.60N	157 51 50.76W	2	30	0	0.4	-12.7
356	452	42	70	N-E	21 18 46.62N	157 52 11.62W	3	31	9	-1.3	10.3
356	532	54	64	N-E	21 18 47.52N	157 52 2.16W	2	32	1	-0.7	2.7
356	642	42	7	N-W	21 18 53.82N	157 52 0.66W	8	0	0	5.6	-0.5
356	720	54	12	N-W	21 18 45.86N	157 52 1.08W	2	18	8	1.7	-0.4
356	752	65	34	S-F	21 18 48.42N	157 52 2.04W	2	34	11	0.2	0.6
356	938	65	30	S-W	21 18 48.24N	157 52 1.20W	2	33	16	0.0	-0.1
356	1128	65	68	N-F	21 18 48.86N	157 52 1.32W	2	33	16	-1.3	-0.2
356	1214	67	12	N-W	21 18 43.08N	157 52 0.72W	3	20	9	-5.1	-0.8
356	1434	64	45	S-E	21 18 48.30N	157 52 1.08W	2	33	3	0.1	0.0
356	1614	42	38	S-F	21 18 49.22N	157 52 1.64W	2	30	15	1.1	0.5
356	1654	54	30	S-F	21 18 50.40N	157 52 1.62W	2	30	3	2.2	0.1
356	1800	42	21	S-W	21 18 43.26N	157 52 1.32W	2	27	12	1.1	-0.2
356	1942	54	27	S-W	21 18 50.76N	157 52 1.50W	2	28	14	2.6	0.0
356	1942	65	23	N-E	21 18 46.92N	157 52 1.20W	2	25	12	-1.3	-0.3
356	2130	65	30	N-W	21 18 47.16N	157 52 1.62W	2	27	13	-1.0	0.7
356	2244	65	21	S-E	21 18 49.02N	157 52 1.38W	2	21	4	0.4	-0.1
356	2332	63	42	N-W	21 18 43.26N	157 51 42.19W	2	14	1	-4.0	-10.7
357	28	65	29	S-W	21 18 49.26N	157 52 1.20W	2	24	12	1.1	-3.3
357	224	64	36	N-F	21 18 48.00N	157 52 0.64W	2	23	14	-0.2	-0.2
357	386	42	29	N-F	21 18 47.64N	157 52 0.64W	2	28	5	-0.3	-0.2
357	442	54	23	N-E	21 18 45.44N	157 52 2.16W	2	28	13	-1.8	0.7
357	644	42	28	N-W	21 18 46.44N	157 52 2.16W	2	31	15	-1.9	0.0
357	628	54	36	N-W	21 18 46.26N	157 52 1.50W	2	32	15	-1.9	0.0
357	700	65	12	S-E	21 18 48.84N	157 52 1.20W	4	21	10	0.6	-0.1
357	800	65	71	S-W	21 18 48.72N	157 51 50.40W	2	37	5	0.5	-2.1
357	1022	65	18	N-E	21 18 48.24N	157 51 50.84W	2	25	11	-3.0	-1.4
357	1046	63	73	S-E	21 18 48.84N	157 51 58.74W	5	31	9	0.5	-0.7
357	1204	65	50	N-W	21 18 45.54N	157 52 0.30W	2	33	6	-2.7	-2.7
357	1236	63	9	S-W	21 18 47.34N	157 52 4.62W	1	10	4	-0.2	3.1
357	1346	64	16	S-E	21 18 48.54N	157 52 1.32W	2	22	0	0.3	-0.2
357	1520	42	11	S-E	21 18 50.76N	157 52 2.82W	2	16	7	2.6	1.3

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

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TABLE 1A-8 (CONT.)

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P/V KANA KEOKI 1973 POSITIONAL DATA, HONOLULU, HAWAII
SECURED WITH PORT SIDE TO PIER 18, 'ANTENNA HEIGHT' +19.0 METERS.

DAY	GMT	SAT	ELEV	GECM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
357	1536	64	49	S-W	21 18 49.56N	157 52 1.14W	2	24	8	1.4	0.4
357	1606	54	9	S-E	21 18 45.72N	157 52 0.14W	2	10	3	-2.5	-1.3
357	1704	42	66	S-W	21 18 49.14N	157 52 0.14W	2	34	16	0.9	-1.3
357	1750	54	75	S-W	21 18 49.02N	157 52 2.24W	2	33	16	0.4	0.4
357	1854	42	7	S-W	21 18 15.42N	157 52 20.10W	5	0	0	-32.8	18.6
357	2040	65	65	N-W	21 18 48.70N	157 52 2.40W	2	32	16	0.6	0.6
357	2234	63	67	N-W	21 18 47.76N	157 52 0.30W	2	28	1	-0.4	-1.2
357	2322	59	61	S-E	21 18 48.16N	157 52 3.04W	2	27	13	0.2	-1.6
358	100	63	12	N-W	21 18 51.18N	157 51 55.82W	2	11	2	3.0	-1.6
358	106	59	9	S-W	21 18 43.02N	157 52 2.16W	2	11	4	-5.2	0.7
358	134	64	13	N-E	21 18 45.24N	157 51 55.44W	2	16	6	-3.9	-3.0
358	306	47	8	N-E	21 18 46.76N	157 52 7.32W	8	7	2	4.6	8.8
358	322	64	60	N-W	21 18 46.42N	157 52 2.04W	2	27	7	-1.6	0.4
358	354	64	7	N-E	21 18 49.16N	157 51 57.00W	2	0	0	0.2	-4.5
358	446	42	78	N-W	21 18 48.60N	157 51 57.72W	8	0	0	0.4	-3.7
358	536	54	60	N-E	21 18 47.40N	157 52 1.20W	8	0	0	-0.8	-0.3
358	640	42	7	N-W	21 18 50.74N	157 51 55.74W	4	0	0	10.5	-1.7
358	726	54	8	N-W	21 18 47.44N	157 52 2.64W	6	0	0	-0.7	1.6
358	822	45	49	S-E	21 18 48.40N	157 52 2.14W	2	38	18	0.4	0.7
358	948	65	21	S-W	21 18 47.94N	157 52 1.12W	2	29	14	-0.3	-0.2
358	1058	59	45	N-E	21 18 45.72N	157 52 2.52W	2	35	17	-2.5	1.0
358	1144	43	27	S-W	21 18 49.20N	157 52 1.32W	2	30	14	1.0	-0.2
358	1244	59	20	N-W	21 18 44.94N	157 52 1.20W	2	27	12	-3.3	-0.4
358	1442	64	64	S-E	21 18 48.66N	157 52 1.32W	2	35	17	0.5	0.5
358	1510	42	41	S-E	21 18 43.00N	157 52 2.04W	2	31	16	0.7	0.5
358	1610	64	12	S-E	21 18 43.72N	157 52 2.70W	3	17	4	1.7	1.2
358	1658	54	39	S-E	21 18 48.66N	157 52 1.64W	2	33	15	0.8	0.5
358	1756	42	19	S-W	21 18 48.60N	157 52 1.60W	2	24	5	0.4	0.3
358	1852	65	34	N-E	21 18 46.68N	157 52 0.72W	2	25	9	-1.2	-0.8
358	2128	65	20	N-W	21 18 47.40N	157 52 1.74W	2	24	11	-0.8	0.3
358	2216	59	12	S-E	21 18 48.64N	157 52 1.64W	3	16	6	0.6	0.5
358	2400	69	47	S-W	21 18 43.62N	157 52 0.84W	2	28	14	1.4	-0.4
359	230	64	52	N-E	21 18 47.34N	157 52 1.38W	2	30	1	-0.0	-0.1
359	356	42	32	N-E	21 18 47.70N	157 52 0.70W	2	29	14	-0.5	-1.2
359	416	64	15	N-W	21 18 47.76N	157 52 1.44W	2	23	11	-0.4	0.5
359	446	54	30	N-E	21 18 46.68N	157 52 0.13W	2	28	3	-1.2	-1.3
359	544	63	26	N-W	21 18 47.74N	157 52 2.16W	2	23	9	-1.4	0.7
359	634	54	27	N-W	21 18 46.56N	157 52 2.52W	2	24	12	-1.5	1.3
359	716	65	19	S-E	21 18 50.10N	157 52 1.64W	3	25	5	1.3	0.5
359	800	65	51	S-W	21 18 49.44N	157 52 0.20W	3	37	18	1.2	-1.2
359	854	59	10	N-E	21 18 47.34N	157 52 1.50W	5	15	7	-0.2	0.0
359	1056	63	71	S-W	21 18 48.42N	157 52 1.38W	2	33	16	0.2	-0.1
359	1136	59	77	N-W	21 18 46.56N	157 51 58.74W	2	36	18	-1.6	-2.7
359	1244	63	7	N-W	21 18 42.34N	157 52 10.20W	12	0	0	-15.0	8.7
359	1326	59	7	N-W	21 18 57.44N	157 52 2.16W	3	0	0	0.6	0.7
359	1356	64	25	S-E	21 18 49.68N	157 52 2.14W	2	27	13	1.5	0.7
359	1518	42	12	S-E	21 18 46.60N	157 52 0.30W	2	16	8	-1.4	-1.2

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1A-8

P/V KANA KEOKI 1973 POSITIONAL DATA, HONOLULU, HAWAII
SECURED WITH PORT SIDE TO PIER 18, 'ANTENNA HEIGHT' +19.0 METERS.

DAY	GMT	SAT	ELEV	GECM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
359	1542	64	33	S-W	21 18 49.66N	157 52 1.74W	2	27	8	0.3	0.3
359	1610	54	13	S-E	21 18 51.30N	157 52 1.22W	2	14	0	3.1	-0.2
359	1700	42	60	S-A	21 18 48.72N	157 52 0.20W	2	34	16	0.5	-1.2
359	1752	54	58	S-W	21 18 49.14N	157 52 1.22W	2	34	17	0.7	-0.2
359	1806	65	11	N-E	21 18 49.56N	157 52 0.6 W	2	15	7	1.4	-1.5
359	2056	65	56	N-W	21 18 46.62N	157 52 0.84W	2	32	16	-1.6	-0.4
359	2248	63	71	N-W	21 18 45.44N	157 52 30.66W	6	18	1	-1.3	20.6
360	34	63	7	N-W	21 18 43.02N	157 52 31.26W	6	0	0	-5.2	20.8
360	144	64	20	N-E	21 18 47.34N	157 51 55.74W	2	25	7	-0.0	-1.7
360	304	42	5	N-E	21 18 43.20N	157 51 55.14W	3	12	5	-5.0	-6.3
360	328	64	42	N-W	21 18 44.62N	157 52 1.18W	2	34	17	-1.4	-0.3
360	358	64	5	N-E	21 18 42.74N	157 52 0.18W	2	5	4	1.5	-1.3
360	444	42	63	N-W	21 18 47.34N	157 52 0.30W	2	30	0	-0.0	-1.2
360	540	64	74	N-W	21 18 47.40N	157 52 0.64W	2	35	16	-0.8	-0.8
360	636	42	7	N-W	21 18 57.48N	157 52 4.60W	2	0	0	0.3	2.5
360	732	64	7	N-W	21 18 43.14N	157 52 4.60W	3	0	0	-0.0	1.1
360	812	64	68	S-E	21 18 48.64N	157 52 3.26W	2	36	2	0.5	1.3
360	1070	65	14	S-W	21 18 49.34N	157 52 0.54W	3	29	12	1.2	-0.2
360	1132	59	29	N-E	21 18 47.26N	157 52 1.22W	2	31	14	-1.3	-0.2
360	1152	43	15	S-W	21 18 48.42N	157 52 1.60W	2	25	11	0.2	0.0
360	1216	59	31	N-W	21 18 45.36N	157 52 1.18W	2	32	14	-2.2	-0.1
360	1452	64	64	S-W	21 18 48.60N	157 51 55.82W	2	36	17	0.7	-1.4
360	1606	42	45	S-E	21 18 48.60N	157 52 1.68W	2	32	15	0.4	0.4
360	1742	64	7	S-W	21 18 44.22N	157 52 4.38W	3	0	0	-4.2	2.0
360	1802	54	51	S-E	21 18 48.50N	157 52 1.68W	2	33	16	0.7	0.5
360	1752	42	18	S-W	21 18 48.72N	157 52 1.74W	2	24	11	0.5	0.3
360	1848	54	15	S-W	21 18 40.64N	157 52 2.64W	2	22	10	1.5	0.6
360	2000	65	51	N-E	21 18 47.40N	157 52 2.22W	2	28	10	-0.8	0.8
360	2150	59	7	S-E	21 18 43.60N	157 52 1.64W	11	0	0	22.3	0.5
360	2232	63	35	N-E	21 18 48.34N	157 52 7.56W	7	13	1	0.2	6.1
360	2332	59	72	S-W	21 18 47.84N	157 52 0.6 W	2	26	0	-0.3	-1.5
361	240	64	72	N-E	21 18 47.84N	157 51 55.74W	6	0	0	-0.3	-2.7
361	352	42	35	N-E	21 18 47.76W	157 52 0.66W	2	28	5	-0.4	-0.4
361	430	64	5	N-W	21 18 49.50N	157 52 1.62W	4	13	5	-1.3	0.1
361	444	64	19	N-E	21 18 47.10N	157 52 1.20W	2	31	2	-1.1	-0.3
361	514	42	24	N-W	21 18 47.64N	157 52 1.68W	2	23	14	-0.5	-0.7
361	636	54	21	N-W	21 18 46.60N	157 52 1.54W	2	27	12	-1.4	0.5
361	724	65	28	S-E	21 18 48.62N	157 52 2.82W	2	33	15	1.7	1.3
361	810	65	34	S-W	21 18 47.68N	157 52 0.64W	2	35	16	1.5	-1.4
361	1104	63	50	S-W	21 18 49.68N	157 52 1.50W	2	34	15	1.5	0.2
361	1254	59	11	N-W	21 18 47.04N	157 52 0.64W	3	17	7	-1.2	-0.3
361	1404	64	34	S-E	21 18 49.14N	157 52 1.74W	2	32	15	0.3	0.3
361	1514	42	14	S-E	21 18 49.62N	157 52 0.30W	2	15	6	1.4	-1.2
361	1550	64	23	S-W	21 18 48.36N	157 52 2.04W	2	27	1	0.8	0.6
361	1612	54	18	S-E	21 18 50.28N	157 52 1.32W	2	24	11	2.1	-0.2
361	1654	42	55	S-W	21 18 48.62N	157 52 0.30W	2	32	3	1.4	-1.2
361	1916	65	18	N-E	21 18 48.06N	157 52 0.66W	2	21	10	-0.1	-0.8

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1A-8 (CONT.)

R/V KANA KECKI 1973 POSITIONAL DATA, HONOLULU, HAWAII
SECURED WITH PORT SIDE TO PIER 18, ANTENNA HEIGHT: 19.0 METERS.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
*361	2058	65	37	N-W	21 18 41.70N	157 52 31.20W	2	22	6	-6.5	29.7
*361	2224	69	22	S-E	21 18 43.14N	157 52 31.66W	2	23	2	-5.1	30.4
*361	2250	63	63	N-W	21 18 44.20N	157 53 27.78W	2	25	1	-2.0	34.3
362	12	99	28	S-W	21 18 49.39N	157 52 1.32W	2	23	10	1.2	-0.2
362	154	64	29	N-E	21 18 44.32N	157 52 0.64W	2	22	0	0.2	-3.6
*362	100	42	10	N-F	21 18 47.28N	157 51 57.60W	2	9	0	-0.3	-1.8
362	140	64	23	N-W	21 18 47.22N	157 52 4.00W	2	30	15	-1.0	0.3
*362	400	64	13	N-F	21 18 47.04N	157 52 1.20W	2	16	5	-1.2	-0.3
362	440	42	72	N-W	21 18 48.06N	157 51 59.34W	2	35	17	-0.1	-2.1
362	542	64	59	N-W	21 18 47.44N	157 52 0.66W	2	33	7	-0.7	-0.9
*362	622	65	82	S-W	21 18 47.14N	157 51 45.50W	3	36	1	-1.0	-15.6
362	1004	69	18	N-E	21 18 47.40N	157 52 1.34W	2	24	6	-0.9	-0.1
362	1022	63	63	S-E	21 18 43.02N	157 52 6.54W	2	13	0	0.4	0.1
362	1148	60	48	N-W	21 18 46.20N	157 52 6.66W	2	35	16	-2.0	-0.4
*362	1318	64	13	S-E	21 18 48.90N	157 52 0.54W	2	19	0	0.7	-0.9
362	1502	64	60	S-W	21 18 49.26N	157 52 1.32W	2	32	11	1.1	-0.2
362	1602	42	49	S-E	21 18 40.26N	157 52 2.28W	2	33	15	1.1	0.4
362	1706	64	67	S-E	21 18 49.62N	157 52 1.32W	2	31	8	1.4	-0.2
362	1748	42	16	S-W	21 18 43.39N	157 52 1.38W	2	22	10	1.8	-0.1
*362	1854	64	11	S-W	21 18 43.62N	157 52 2.16W	5	16	7	1.4	0.7
362	2018	65	68	N-W	21 18 47.38N	157 52 4.00W	2	26	9	-1.3	2.8
362	2202	63	62	N-E	21 18 48.30N	157 52 1.08W	2	21	3	0.1	-3.4
362	2304	69	64	S-E	21 18 48.06N	157 52 1.08W	2	28	14	0.4	0.5
362	2350	63	17	N-W	21 18 46.09N	157 52 1.74W	2	20	0	-2.1	0.3
*363	50	69	8	S-W	21 18 47.04N	157 52 3.48W	2	9	3	-1.2	2.0
*363	108	64	9	N-F	21 18 54.60N	157 52 6.78W	3	10	1	6.4	5.3
*363	248	76	7	N-W	21 18 43.54N	157 52 15.00W	2	29	0	0.3	14.2
363	388	42	38	N-F	21 18 47.58N	157 52 0.18W	2	29	8	-0.6	-1.3
*363	442	64	7	N-W	21 18 58.56N	157 52 3.30W	4	0	0	10.4	1.3
363	454	64	50	N-E	21 18 47.04N	157 52 1.38W	2	30	14	-1.2	-0.1
363	534	42	22	N-W	21 18 48.62N	157 52 1.32W	2	26	10	-1.6	-0.2
363	640	64	15	N-W	21 18 45.56N	157 52 2.28W	2	22	10	-2.2	0.8
363	734	65	40	S-E	21 18 49.08N	157 52 2.28W	2	35	17	0.7	1.5
363	820	64	24	S-W	21 18 49.70N	157 52 0.72W	2	30	3	0.7	-0.8
363	1040	63	46	N-F	21 18 46.26N	157 52 2.70W	2	33	1	-1.9	1.2
363	1112	63	35	S-W	21 18 40.50N	157 52 1.08W	2	32	12	1.3	-0.4
363	1228	69	19	N-W	21 18 45.60N	157 52 2.70W	2	25	12	-2.6	1.2
363	1414	64	53	S-E	21 18 43.02N	157 52 1.50W	2	32	15	0.8	0.0
363	1508	42	15	S-E	21 18 47.48N	157 52 1.62W	2	23	10	1.8	0.1
363	1600	64	15	S-W	21 18 49.78N	157 52 1.74W	2	22	10	0.7	0.1
363	1620	64	24	S-F	21 18 40.34N	157 52 3.18W	2	16	2	1.2	1.7
363	1654	42	50	S-W	21 18 50.04N	157 52 2.16W	2	31	15	1.3	0.7
363	1800	64	34	S-W	21 18 50.46N	157 52 1.04W	2	31	14	2.3	0.5
363	1924	65	28	N-F	21 18 48.06N	157 52 0.66W	2	27	13	-0.1	-3.8
363	2110	65	25	N-F	21 18 47.54N	157 52 2.40W	2	26	2	-0.5	0.0
*363	2158	69	13	S-E	21 18 51.36N	157 52 5.54W	2	13	0	3.9	4.5
363	2300	63	45	N-W	21 18 46.80N	157 52 2.16W	2	35	17	-1.4	0.7

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1A-8

R/V KANA KECKI 1973 POSITIONAL DATA, HONOLULU, HAWAII
SECURED WITH PORT SIDE TO PIER 18, ANTENNA HEIGHT: 19.0 METERS.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
363	2342	69	45	S-W	21 18 50.70N	157 52 0.72W	2	29	13	2.8	-0.4
364	200	64	42	N-E	21 18 47.88N	157 52 1.32W	2	28	10	-0.6	-0.2
*364	256	42	12	N-F	21 18 47.64N	157 51 50.40W	2	15	6	-0.3	-2.1
364	348	64	20	N-W	21 18 46.32N	157 52 1.08W	2	27	12	-1.0	0.5
364	436	42	66	N-W	21 18 47.52N	157 52 1.12W	2	22	0	-0.7	-0.2
364	544	64	45	N-W	21 18 46.56N	157 52 1.08W	2	34	17	-1.2	-0.4
364	646	65	14	S-E	21 18 49.50N	157 52 2.24W	2	24	7	1.3	0.4
364	632	65	41	S-W	21 18 45.32N	157 51 50.76W	3	37	19	1.1	-1.7
*364	1012	63	7	S-W	21 18 43.62N	157 52 5.04W	4	3	1	-5.0	3.6
364	1310	69	7	N-W	21 18 10.02N	157 52 5.16W	8	0	0	23.7	3.7
*364	538	69	11	N-E	21 18 46.64N	157 51 58.68W	2	16	7	-2.1	-2.4
*364	1022	63	75	S-E	21 18 48.18N	157 51 50.64W	11	0	0	-1.0	-1.9
364	1118	69	73	N-W	21 18 46.62N	157 51 50.74W	3	34	16	-1.6	-2.1
364	1206	64	20	S-E	21 18 43.54N	157 52 1.08W	2	25	12	1.8	-2.4
364	1510	64	41	S-W	21 18 40.62N	157 52 1.32W	2	31	15	1.4	-0.2
364	1558	42	54	S-F	21 18 49.14N	157 52 2.16W	2	34	16	0.3	0.7
*364	1708	64	74	S-E	21 18 47.02N	157 52 2.64W	7	0	0	0.8	1.2
*364	1746	42	14	S-W	21 18 50.58N	157 52 1.34W	2	21	10	2.4	-0.1
*364	1838	65	9	N-E	21 18 43.20N	157 51 55.08W	2	10	4	1.0	-2.5
364	1858	64	7	S-W	21 18 38.34N	157 52 2.64W	4	4	1	-3.3	1.2
364	2200	65	71	N-W	21 18 47.16N	157 52 1.38W	2	31	1	-1.0	-2.4
*364	2210	63	71	N-E	21 18 55.02N	157 52 42.84W	3	30	7	6.8	41.4
364	2236	69	39	S-W	21 18 48.56N	157 52 1.08W	2	28	14	0.8	0.5
*364	2400	63	11	N-W	21 18 47.40N	157 52 2.62W	3	14	1	-0.4	1.0
365	20	69	14	S-W	21 18 48.84N	157 52 0.64W	2	21	10	0.4	-0.5
365	114	64	52	N-E	21 18 48.66N	157 51 59.40W	2	21	7	0.8	-2.1
365	206	64	62	N-W	21 18 47.62N	157 52 1.20W	2	34	16	-1.0	-2.3
365	242	42	42	N-E	21 18 47.34N	157 52 1.08W	2	33	16	-0.3	-0.4
365	454	64	46	N-F	21 18 47.00N	157 52 1.00W	2	32	2	-0.8	0.0
365	530	42	20	N-W	21 18 46.50N	157 52 2.16W	2	25	8	-1.7	0.7
*365	634	64	11	N-W	21 18 45.42N	157 52 1.32W	5	17	7	-2.8	-0.2
365	744	65	58	S-E	21 18 40.26N	157 52 3.72W	2	33	4	1.1	2.2
365	838	65	17	S-W	21 18 49.62N	157 52 0.18W	2	26	12	-1.6	-3.3
365	1014	69	30	N-W	21 18 46.76N	157 52 1.20W	2	31	14	-1.3	-2.1
365	1120	63	25	S-W	21 18 42.38N	157 52 2.04W	2	29	13	1.2	0.6
365	1158	69	29	N-W	21 18 46.02N	157 52 1.62W	2	30	0	-2.2	0.1
*365	1422	64	76	S-E	21 18 48.60N	157 52 1.86W	2	25	1	0.4	0.4
365	1504	42	17	S-E	21 18 49.74N	157 52 1.34W	2	22	0	1.5	-0.1
*365	1610	64	6	S-W	21 18 44.46N	157 52 3.66W	3	11	1	-1.7	-2.5
365	1650	42	44	S-W	21 18 50.16N	157 52 1.20W	2	32	16	1.0	0.1
365	1804	64	26	S-W	21 18 50.58N	157 52 2.16W	2	29	13	3.4	0.7
365	1932	65	42	N-E	21 18 47.88N	157 52 1.20W	2	29	13	-0.3	-0.3
365	2120	65	16	N-W	21 18 45.66N	157 52 3.18W	2	23	10	-2.5	1.7
365	2308	63	32	N-W	21 18 47.58N	157 52 1.50W	2	29	12	-0.5	0.0
1	210	64	61	N-E	21 18 48.00N	157 52 0.30W	2	33	14	-0.2	-1.2
*1	250	42	13	N-E	21 18 43.44N	157 51 58.02W	2	10	0	-4.8	-3.5

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1A-8 (CONT.)

R/V KANA KEOKI 1973 POSITIONAL DATA, HONOLULU, HAWAII
SECURED WITH PORT SIDE TO PIER 1A, 'ANTENNA HEIGHT' +19.0 METERS.

DAY	GMT	SAT	ELEV	CFCH	LATITUDE	LONGITUDE	IT	CTS	CISO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
* 1	358	64	12	N-W	21 18 43.44N	157 52 1.32W	5	20	9	-4.4	-0.2
1	434	42	61	N-W	21 18 47.04N	157 52 1.34W	2	33	1	-1.2	-0.1
1	550	54	34	N-W	21 18 47.42N	157 52 1.04W	2	31	15	-1.0	-0.4
* 1	624	42	7	N-W	21 18 34.74N	157 52 5.84W	12	0	0	46.5	4.4
1	754	45	23	S-E	21 18 50.40N	157 52 2.16W	2	29	0	2.2	0.7
1	842	45	43	S-W	21 18 50.70N	157 51 59.74W	2	34	19	2.5	-1.7
1	1032	43	65	S-W	21 18 44.78N	157 52 0.84W	2	33	7	0.6	-0.6
1	1154	49	74	N-E	21 18 47.64N	157 52 0.84W	2	31	15	-0.3	-0.6
* 1	1224	43	7	S-W	21 18 54.60N	157 52 7.20W	2	0	0	-53.5	5.7
* 1	1240	59	10	N-W	21 18 46.02N	157 52 1.20W	2	15	4	-2.2	-0.3
1	1314	44	29	S-E	21 18 49.64N	157 52 1.54W	2	31	15	1.7	0.0
1	1520	44	28	S-W	21 18 49.02N	157 52 1.32W	2	27	2	1.7	-0.2
1	1554	42	59	S-E	21 18 44.00N	157 52 1.04W	2	33	0	0.7	0.5
1	1712	54	73	S-W	21 18 48.78N	157 52 2.24W	2	33	6	0.5	0.4
* 1	1742	42	13	S-W	21 18 50.10N	157 52 1.50W	2	19	9	1.3	0.2
1	1848	45	15	N-E	21 18 49.72N	157 52 0.94W	2	18	8	0.3	-0.5
* 1	1902	44	7	S-W	21 18 23.64N	157 52 10.44W	4	0	0	-21.7	9.3
1	2010	45	47	N-W	21 18 46.20N	157 52 2.24W	2	23	7	-2.0	0.3
1	2204	49	23	S-E	21 18 50.34N	157 52 1.38W	2	24	11	2.1	-0.1
* 1	2224	41	77	N-W	21 18 44.78N	157 52 5.16W	5	17	1	0.6	1.7
1	2354	52	26	S-W	21 18 49.84N	157 52 1.54W	2	24	12	1.7	0.5
* 2	12	63	7	N-W	21 18 58.20N	157 52 2.24W	6	0	0	10.0	0.3
2	122	64	23	N-E	21 18 44.64N	157 52 1.04W	2	27	11	0.3	-0.4
2	146	44	36	N-W	21 18 47.62N	157 52 2.04W	2	24	0	-0.7	0.6
2	340	42	44	N-E	21 18 47.64N	157 52 0.94W	2	28	3	-0.6	-0.9
* 2	458	54	65	N-E	21 18 48.65N	157 52 7.32W	11	0	0	0.5	5.8
2	524	42	18	N-W	21 18 47.62N	157 52 1.50W	2	20	0	-0.4	0.6
* 2	612	45	7	S-E	21 18 42.00N	157 51 56.64W	2	0	0	-6.2	-4.4
2	650	54	7	N-W	21 18 41.42N	157 52 1.12W	2	0	0	3.2	-0.2
* 2	754	44	76	S-E	21 18 53.34N	157 52 2.24W	2	33	1	1.9	4.8
2	842	45	11	S-W	21 18 50.16N	157 52 2.62W	6	0	0	2.0	1.0
2	1130	41	17	S-W	21 18 48.60N	157 52 2.64W	2	21	5	0.4	1.2
* 2	1248	44	0	S-E	21 18 34.34N	157 52 1.04W	2	10	0	-0.3	0.4
2	1642	45	63	N-E	21 18 48.64N	157 52 0.04W	2	27	1	0.1	-1.4
2	2130	41	38	N-E	21 18 40.62N	157 51 56.84W	2	11	0	1.4	-2.6
2	2246	49	66	S-E	21 18 44.14N	157 52 2.40W	2	30	14	-0.2	0.2
2	2318	43	23	N-W	21 18 47.62N	157 52 2.04W	2	29	14	-0.4	0.6
* 3	32	45	0	S-W	21 18 26.04N	157 52 3.96W	2	8	4	-22.2	2.5
* 3	218	44	84	N-E	21 18 47.14N	157 52 31.02W	2	30	0	-1.0	30.4
* 3	246	42	14	N-E	21 18 47.74N	157 52 1.12W	2	18	8	-0.4	-0.2
3	410	54	30	N-E	21 18 47.34N	157 52 0.64W	2	24	0	-0.3	-0.2
3	410	42	56	N-W	21 18 47.14N	157 52 1.20W	2	24	0	-1.0	-0.1
3	544	54	24	N-W	21 18 47.14N	157 52 2.40W	2	28	3	-1.0	0.2
3	706	45	34	S-E	21 18 50.40N	157 52 2.82W	2	33	16	2.2	1.3
3	852	45	30	S-W	21 18 49.22N	157 52 0.30W	2	26	1	1.7	-1.2
3	1024	49	47	N-E	21 18 49.12N	157 52 2.52W	2	34	16	-0.1	1.0
3	1044	43	46	S-W	21 18 49.50N	157 52 1.74W	2	24	8	1.3	0.2

* = FIX NET USED FOR COMPUTATION OF THE MEAN

TABLE 1A-8

R/V KANA KEOKI 1973 POSITIONAL DATA, HONOLULU, HAWAII
SECURED WITH PORT SIDE TO PIER 1A, 'ANTENNA HEIGHT' +19.0 METERS.

DAY	GMT	SAT	ELEV	CFCH	LATITUDE	LONGITUDE	IT	CTS	CISO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
3	1210	49	17	N-W	21 18 46.54N	157 52 2.04W	2	25	11	-1.4	0.5
3	1242	44	43	S-E	21 18 44.24N	157 52 1.74W	2	33	15	0.0	0.3
3	1530	44	12	S-W	21 18 51.14N	157 52 6.00W	2	15	1	3.0	5.4
3	1550	42	54	S-E	21 18 48.44N	157 52 1.32W	2	34	16	0.3	-0.2
3	1716	54	55	S-W	21 18 43.14N	157 52 1.02W	2	32	1	0.9	-0.4
* 3	1736	42	11	S-W	21 18 51.12N	157 52 1.38W	2	17	7	2.0	-0.1
3	1856	45	23	N-E	21 18 47.70N	157 51 55.74W	2	24	7	-0.5	-1.7
3	2040	45	32	N-W	21 18 45.56N	157 52 2.16W	2	30	15	-1.6	0.7
* 3	2140	49	14	S-E	21 18 41.04N	157 51 54.84W	6	14	0	-4.3	-6.4
3	2224	43	59	N-W	21 18 48.00N	157 52 0.04W	2	34	0	-0.2	-1.4
3	2326	43	43	S-W	21 18 50.64N	157 52 2.04W	2	26	12	2.7	0.4
4	134	44	34	N-E	21 18 47.62N	157 52 0.04W	2	23	11	-0.7	-1.4
4	318	44	24	N-W	21 18 47.34N	157 52 1.02W	2	10	2	-0.9	0.1
4	338	42	50	N-E	21 18 47.82N	157 51 55.74W	2	24	0	-0.4	-1.7
4	502	44	60	N-W	21 18 47.84N	157 52 0.72W	2	30	1	-0.3	-0.9
4	522	42	16	N-W	21 18 46.62N	157 52 1.32W	2	24	11	-1.3	-0.2
* 4	620	45	12	S-E	21 18 50.54N	157 52 2.04W	3	19	0	2.4	0.6
4	644	54	7	N-W	21 18 42.72N	157 52 4.60W	4	0	0	24.5	3.0
* 4	802	45	73	S-W	21 18 48.00N	157 51 56.84W	3	14	10	-0.2	-2.6
4	920	49	11	N-E	21 18 45.84N	157 51 50.40W	5	16	8	-0.4	-2.1
4	950	43	67	S-E	21 18 48.30N	157 52 1.12W	2	25	0	0.1	-0.2
4	1102	49	70	N-W	21 18 44.20N	157 52 1.20W	2	34	13	-2.0	-0.3
* 4	1138	43	11	S-W	21 18 44.20N	157 52 2.70W	2	14	1	2.0	1.2
4	1252	45	7	N-W	21 18 50.04N	157 52 1.16W	2	8	0	0.7	0.7
4	1440	44	51	S-W	21 18 43.32N	157 52 1.32W	2	34	16	1.1	-0.2
4	1510	42	21	S-E	21 18 40.34N	157 52 0.72W	2	18	2	1.2	-0.8
4	1624	54	53	S-E	21 18 49.54N	157 52 2.14W	2	35	17	0.3	0.7
4	1644	42	39	S-W	21 18 49.68N	157 52 1.32W	2	28	13	1.4	-0.2
4	1812	54	15	S-W	21 18 45.44N	157 52 2.24W	2	22	10	1.2	0.8
* 4	1952	45	87	N-W	21 18 47.76N	157 52 20.22W	2	21	12	-0.4	18.7
4	2132	43	44	N-E	21 18 47.62N	157 52 0.04W	2	14	0	0.8	-1.4
5	1504	45	34	N-E	21 18 48.72N	157 52 0.18W	2	27	11	0.5	-1.3
5	2050	45	21	N-W	21 18 46.32N	157 52 2.16W	2	22	8	-1.9	0.7
5	2216	43	42	N-W	21 18 47.40N	157 52 1.84W	2	35	17	-0.4	0.4
5	2256	49	72	S-W	21 18 49.32N	157 52 1.12W	2	20	1	1.1	-0.2
6	140	44	45	N-E	21 18 47.52N	157 52 0.06W	2	28	0	-0.7	-0.5
* 6	162	44	13	N-E	21 18 51.12N	157 52 1.78W	4	12	0	2.9	-0.1
6	204	54	56	N-W	21 18 47.70N	157 52 0.42W	2	34	17	-0.6	-1.1
6	224	45	10	S-E	21 18 50.76N	157 52 1.84W	2	24	13	2.6	0.4
6	2334	49	26	S-W	21 18 49.68N	157 52 1.86W	2	25	12	1.8	0.4
7	52	44	13	N-E	21 18 47.22N	157 51 59.22W	2	21	9	-1.0	-2.3
7	238	44	44	N-W	21 18 46.68N	157 52 1.38W	2	21	2	-1.6	-0.5
7	414	54	52	N-E	21 18 47.34N	157 52 1.62W	2	33	15	-0.9	0.1
7	602	54	15	N-W	21 18 46.02N	157 52 1.50W	2	21	10	-2.2	0.0
7	724	45	67	S-E	21 18 48.54N	157 52 4.02W	2	38	18	0.3	2.5

* = FIX NET USED FOR COMPUTATION OF THE MEAN

AD-A047 586

HAWAII INST OF GEOPHYSICS HONOLULU

F/G 8/5

THE ACCURACY OF CHARTED PORT POSITIONS IN THE PACIFIC AS DEFINE--ETC(U)

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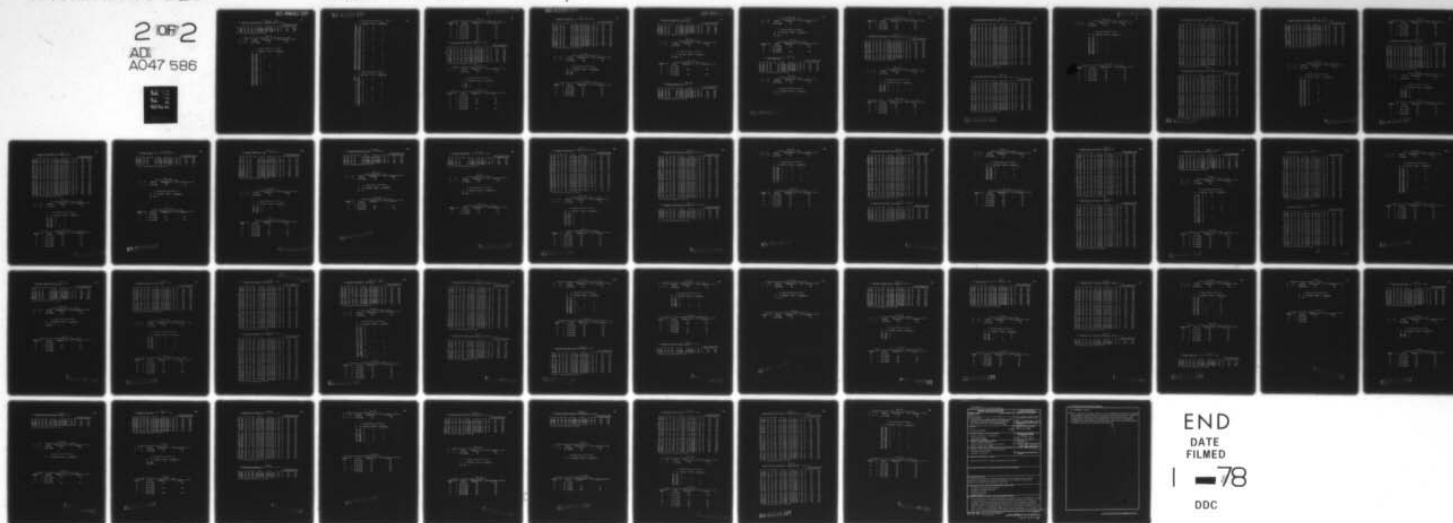
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TABLE 1A-8 (CONT.)

R/V KANA KFOKI 1973 POSITIONAL DATA, HONOLULU, HAWAII
SECURED WITH PORT SIDE TO PIER 18, 'ANTENNA HEIGHT' +19.0 METERS.

DAY	GMT	SAT	ELEV	CECM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
* 7	510	65	14	S-W	21 23 39.16N	157 52 22.92W	4	15	5	200.0	201.4
7	930	99	19	N-E	21 18 46.92N	157 52 0.66W	3	25	11	-1.3	-0.8
7	1058	63	22	S-W	21 18 49.68N	157 52 1.50W	2	26	0	1.5	0.0
7	1118	99	42	N-W	21 18 46.58N	157 52 1.32W	2	24	9	-1.2	-0.2
* 7	1400	64	77	S-E	21 18 48.30N	157 51 55.80W	3	34	1	0.1	-4.7

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1B-8

ARITHMETIC MEAN SOLUTION, HONOLULU, PIER 18, 'ANT. HEIGHT' +19.0 METERS

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
377	125	252	21 18 48.19N 157 52 1.42W	1.4 1.2	0.1 0.1

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
353	436	X		
353	812	X		X
353	1035		X	X
353	1514			
353	1702	X		
353	1718		X	
353	1900	X		X
353	1930	X		
353	2234	X		
354	450	X		
354	644	X	X	
354	1012	X		
354	1154		X	
354	1344	X		X
355	840		X	X
355	1028	X		X
355	1048		X	
355	1226	X		
355	1338	X		
355	1856	X		
355	1934	X		
355	2214	X		
355	2348		X	X
356	310			
356	642	X		
356	720	X		
356	1314	X		X
356	2332			
357	706	X		
357	1048		X	
357	1236	X		
357	1520	X		
357	1604	X		
357	1854	X	X	X
357	2040		X	
358	28	X		
358	104	X		
359	136	X		

ALL PROBLEM PASSES ARE LISTED BELOW (CONT.)

DAY	GMT	ELEVATION		ITERATIONS	DEVIATION
		<15	>75		
359	306	X		X	
359	354	X			
359	444		X	X	
359	535			X	
359	640	X			X
359	726	X		X	
359	1630	X			
359	2216	X			
359	254	X		X	
359	1134		X		
359	1246	X		X	X
359	1325	X			
359	1514	X			
359	1510	X			
359	1906	X			
359	2244			X	X
360	34	X		X	X
360	304	X			
360	358	X			
360	540		X		
360	636	X			
360	732	X			
360	1000	X			
360	1452		X		
360	1642	X			
360	2150	X		X	X
360	2202			X	
361	240			X	
361	410	X			
361	1256	X			
361	1514	X			
361	2058				X
361	2226				X
361	2250				X
362	370	X			
362	400	X			
362	822		X		X
362	1318	X			
362	1854	X		X	
363	50	X			
363	103	X			
363	244	X	X		X
363	442	X			X
363	2158	X			
364	256	X			
364	1212	X			
364	1310	X		X	X
364	938	X			
364	1022			X	
364	1708		X	X	
364	1746	X			
364	1838	X			
364	1858	X			

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION		ITERATIONS	DEVIATION
		<15	>75		
364	2210				X
364	2400	X			
365	644	X		X	
365	1422		X		
365	1610	X			
1	250	X			
1	358	X		X	
1	626	X		X	X
1	1224	X			X
1	1240	X			
1	1742	X			
1	1902	X			X
1	2226		X		
2	12	X		X	
2	459			X	
2	612	X			
2	650	X		X	
2	754	X	X	X	
2	942	X			
2	1248	X			
3	32	X			X
3	218		X		X
3	246	X			
3	1738	X			
3	2140	X		X	
4	520	X			
4	654	X		X	X
4	920	X		X	
4	1138	X			
4	1252	X		X	
4	1952		X		X
6	322	X			
7	910	X			X
7	1400		X		

TABLE 1C-8

BY SATELLITE, MEAN SOLUTION, HONOLULU, PIER 18, 'ANT. HEIGHT' +19.0 METERS

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	45	21 18 48.29N 157 52 1.45W	1.1 1.8	0.2 0.3
54	44	21 18 48.25N 157 52 1.45W	1.1 1.8	0.2 0.3
63	26	21 18 48.26N 157 52 1.51W	1.0 2.3	0.2 0.4
64	45	21 18 48.29N 157 52 1.45W	1.1 1.8	0.2 0.3
65	52	21 18 48.27N 157 52 1.48W	1.2 1.6	0.2 0.2
95	40	21 18 48.26N 157 52 1.52W	1.1 1.8	0.2 0.3

TABLE 1A-9

P/V KANA KEEKI 1974 POSITIONAL DATA, HONOLULU, HAWAII
MOORED TO WEST SIDE OF PIER 40 (A.B.).

DAY	GMT	SAT	ELEV	CECM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
9	100	64	25	A-E	21 19 3.72N	157 52 52.74W	4	22	6	-0.4	-1.3
9	250	54	30	N-W	21 19 2.22N	157 52 54.00W	2	23	9	-2.1	0.8
9	418	42	43	N-W	21 19 4.43N	157 52 54.24W	2	17	4	0.1	0.2
9	550	65	9	S-E	21 19 3.00N	157 52 54.48W	3	12	6	-1.3	0.4
9	678	54	10	N-W	21 19 2.29N	157 52 54.55W	3	15	5	-2.0	0.6
9	734	66	67	S-W	21 19 3.44N	157 52 37.20W	0	0	0	-0.8	-16.0
9	802	99	11	N-E	21 19 3.82N	157 52 51.05W	2	18	6	1.5	-2.1
9	913	63	33	S-W	21 18 54.58N	157 53 34.02W	10	11	0	-7.7	37.9
9	1044	66	66	N-W	21 19 2.64N	157 52 53.04W	2	34	16	-1.7	-1.0
9	1126	63	15	S-W	21 19 4.32N	157 52 53.15W	2	20	0	0.6	-0.5
9	1226	64	12	S-F	21 19 3.92N	157 52 52.46W	2	18	8	-0.4	-0.7
9	1410	64	64	S-W	21 19 4.74N	157 52 54.00W	2	35	15	0.4	-0.0
9	1540	54	33	S-F	21 19 2.70N	157 52 56.86W	2	14	6	-1.5	4.8
9	1728	54	26	S-W	21 19 6.60N	157 52 53.82W	2	25	5	2.3	-0.3
9	1822	65	67	A-F	21 19 5.46N	157 52 52.38W	2	25	0	1.1	-1.7
9	2200	69	43	S-E	21 19 6.00N	157 52 53.40W	2	30	14	1.7	-0.7
9	2254	63	21	N-W	21 19 4.02N	157 52 53.94W	2	26	0	-0.3	-0.1

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 1B-9

ARITHMETIC MEAN SOLUTION, HONOLULU, PIER 40 (A.B.).

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
17	6	11	21 19 4.31N 157 52 54.09W	1.4 1.7	0.4 0.5

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
9	550	X		
9	608	X		
9	734		X	X
9	902	X		
9	918		X	X
9	1226	X		

TABLE 1C-9

BY SATELLITE, MEAN SOLUTION, HONOLULU, PIER 40 (A.B.).

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	1	21 19 4.44N 157 52 54.24W		
54	2	21 19 3.57N 157 52 54.55W	1.2 3.3	0.2 2.1
63	2	21 19 3.57N 157 52 56.55W	1.2 3.3	0.2 2.1
64	3	21 19 4.59N 157 52 55.44W	2.0 2.8	1.1 1.6
65	1	21 19 4.44N 157 52 54.24W		
95	2	21 19 3.57N 157 52 54.55W	1.2 3.3	0.2 2.1

TABLE 2A-1

90

P/V NAHT 1970 POSITIONAL DATA: PAGO PAGO, SANCA ISLANDS
RECORDED TO THE 'OIL DOCK'

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
154	344	54	20		14 16 39.52S	170 40 55.86W	2	22	11	3.6	0.5
154	514	42	62		14 16 33.54S	170 40 56.74W	2	26	10	-0.9	1.4
154	624	64	84		14 16 32.10S	170 40 51.78W	3	32	0	-0.8	-3.5
154	1224	63	12		14 16 34.26S	170 40 55.50W	2	28	12	-0.6	-1.2
154	1242	54	26		14 16 34.08S	170 40 54.18W	2	23	10	-0.8	-1.1
154	1414	63	22		14 16 35.42S	170 40 55.54W	2	25	11	0.5	0.7
154	1524	64	28		14 16 34.38S	170 40 56.52W	2	25	11	-0.5	1.2
154	1556	42	63		14 16 34.02S	170 40 54.14W	2	32	15	-0.2	-1.1
154	2550	64	43		14 16 35.40S	170 40 55.20W	2	22	14	0.5	-0.1
154	2142	64	17		14 16 34.64S	170 40 58.38W	3	14	3	1.6	-3.1
155	14	63	26		14 16 34.78S	170 40 55.62W	2	22	1	1.9	0.3
155	104	54	12		14 16 33.74S	170 40 54.14W	2	19	9	-1.1	-1.1
155	200	63	33		14 16 35.64S	170 40 55.50W	2	24	9	0.7	0.2
155	250	54	57		14 16 35.14S	170 40 55.74W	2	30	13	0.3	0.4
155	440	42	43		14 16 35.74S	170 40 54.54W	2	24	14	0.0	-0.8
155	628	42	17		14 16 44.34S	170 40 54.73W	2	16	5	-0.4	-0.5
155	734	64	31		14 16 34.20S	170 40 53.46W	2	23	8	-0.7	-1.2
155	924	64	24		14 16 35.34S	170 40 56.24W	2	19	6	0.4	1.0
155	1140	63	10		14 16 35.64S	170 40 57.32W	2	12	1	1.7	-1.0
155	1224	63	42		14 16 35.24S	170 40 57.06W	2	20	12	0.4	1.7
155	1436	54	75		14 16 33.00S	170 40 55.86W	3	26	1	-1.9	0.5
155	1602	42	19		14 16 32.64S	170 40 51.78W	2	23	10	-2.3	-3.5
155	1750	42	38		14 16 32.10S	170 40 53.68W	2	25	11	-2.8	-1.4
155	1902	64	15		14 16 34.14S	170 40 54.30W	2	22	10	-0.8	-1.0
155	2050	64	48		14 16 34.06S	170 40 55.08W	2	26	11	1.2	-0.2

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 2B-1

ARITHMETIC MEAN SOLUTION AT PAGO PAGO OIL DOCK

NP	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
25	4	21	14 16 34.91S 170 40 55.32W	1.5 1.4	0.3 0.3

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF APC
154	824		X	
155	104	X		
155	628			X
155	1140	X		

TABLE 2C-1

BY SATELLITE ----- ARITHMETIC MEAN SOLUTION AT PAGO PAGO OIL DOCK

SATELLITE NUMBER	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	5	14 16 33.70S 170 40 54.23W	1.4 1.8	0.6 0.9
54	5	14 16 33.70S 170 40 54.23W	1.4 1.8	0.6 0.9
62	5	14 16 33.70S 170 40 54.23W	1.4 1.8	0.6 0.9
64	6	14 16 34.50S 170 40 54.50W	2.3 1.7	1.0 0.7

TABLE 3A-1

R/V MAHI 1970 POSITIONAL DATA, SUVA, FIJI
RECORDED AT THE EAST END OF 'KING'S WHARF'

DAY	GMT	SAT	ELEV	GFCW	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
175	138	64	23		18 7 46.56S	178 25 35.94E	2	22	2	-0.9	1.9
175	1226	64	34		18 7 47.04S	178 25 33.00E	2	24	13	0.6	-1.1
175	1216	63	61		18 7 46.62S	178 25 33.24E	2	28	1	-0.7	-0.9
175	1240	64	21		18 7 48.06S	178 25 34.56E	2	27	12	0.7	0.5
175	1404	63	5		18 7 43.08S	178 25 30.00E	6	11	5	-4.3	-3.2
175	1426	64	36		18 7 47.46S	178 25 33.42E	2	32	15	0.1	-0.7
175	1620	42	70		18 7 46.02S	178 25 34.98E	2	33	13	-1.3	0.0
175	1906	64	10		18 7 41.76S	178 25 35.40E	4	14	4	-5.6	1.3
175	1948	64	70		18 7 49.84S	178 25 33.54E	2	36	18	1.5	-0.6

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 3B-1

ARITHMETIC MEAN SOLUTION AT SUVA

NP	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
9	2	7	18 7 47.36S 178 25 34.10E	1.0 1.1	0.4 0.4

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
175	1404	X	X	
175	1806	X		

TABLE 3C-1

ARITHMETIC MEAN SOLUTION BY SATELLITE AT SUVA

SATELLITE ALHMER	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	1	18 7 46.02S 178 25 34.98E		
54	2	18 7 47.04S 178 25 34.77E	1.4 0.3	1.3 0.2
63	1	18 7 46.02S 178 25 34.98E		
64	3	18 7 47.18S 178 25 34.32E	1.0 0.8	0.6 0.5

TABLE 3A-2

R/V MAHI 1970 POSITIONAL DATA, SUVA, FIJI
AT DOLPHINS, NEAR THE CRUICK

DAY	GMT	SAT	ELEV	GFCW	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
176	146	54	46		18 7 51.42S	178 25 35.10E	2	25	1	2.3	-2.5
176	404	42	52		18 7 40.56S	178 25 38.54E	2	32	14	0.6	1.0
176	552	42	14		18 7 50.14S	178 25 35.10E	2	19	2	1.3	-2.5
176	1128	63	26		18 7 48.10S	178 25 40.02E	2	26	1	-0.8	2.3
176	1314	63	29		18 7 46.20S	178 25 35.18E	2	31	14	-2.8	-1.8
176	1334	54	81		18 7 40.56S	178 25 42.36E	2	34	15	2.4	4.8
176	1526	42	23		18 7 45.04S	178 25 30.28E	2	28	13	0.1	1.7
176	1712	42	34		18 7 50.52S	178 25 36.18E	2	31	14	1.5	-1.4
176	1900	64	45		18 7 50.58S	178 25 37.40E	2	35	17	1.6	-0.1
176	2214	63	21		18 7 46.90S	178 25 38.58E	2	23	1	-2.5	1.0

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 3B-2
ARITHMETIC MEAN SOLUTION AT SUVA

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
10	2	2	18 7 49.00S 178 25 37.55E	1.9 1.6	0.7 0.5

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
176	552	X		
176	1334		X	

TABLE 3C-2
ARITHMETIC MEAN SOLUTION BY SATELLITE AT SUVA

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	3	18 7 49.72S 178 25 37.68E	0.7 1.3	0.4 0.2
54	1	18 7 49.56S 178 25 38.58E		
63	3	18 7 49.72S 178 25 37.68E	0.7 1.3	0.4 0.4

TABLE 3A-3
R/V NAHI 1970 POSITIONAL DATA, SUVA, FIJI
SHIP INSIDE DRYDOCK

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSD	DEVIATION FROM THE MEAN (IN SECONDS OF ARC) LATITUDE LONGITUDE
177	244	54	20		18 7 45.48S	178 25 36.16E	2	26	6	-4.1 0.9
177	312	42	17		18 7 47.34S	178 25 40.42E	2	24	11	-2.3 3.5
177	456	42	47		18 7 49.14S	178 25 34.09E	2	33	13	-0.5 -1.1
177	648	64	34		18 7 48.96S	178 25 36.60E	2	29	10	-0.6 2.2
177	640	64	23		18 7 49.14S	178 25 37.26E	3	17	4	-0.5 -0.1
177	1432	54	18		18 7 54.90S	178 25 37.50E	2	12	1	5.3 0.1
177	1618	42	72		18 7 50.40S	178 25 35.40E	2	26	1	0.8 -2.0
177	1806	42	8		18 7 49.96S	178 25 35.40E	2	7	1	-3.6 -2.0
177	1558	64	47		18 7 51.48S	178 25 36.30E	2	34	16	1.9 -1.1

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 3B-3
ARITHMETIC MEAN SOLUTION AT SUVA

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
9	1	8	18 7 49.60S 178 25 37.40E	2.9 2.2	1.0 0.8

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
177	1806	X		

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TABLE 3C-3

ARITHMETIC MEAN SOLUTION BY SATELLITE AT SUVA

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	3	18 7 48.56S 178 25 36.40E	1.5 3.6	0.9 2.1
54	2	18 7 48.24S 178 25 37.50E	1.3 4.8	0.9 3.4
64	3	18 7 48.96S 178 25 36.40E	1.5 3.6	0.9 2.1

TABLE 3A-4

P/V KAPA KFOKI 1971 POSITIONAL DATA. SUVA, FIJI
MOORED AT THE NORTH WEST END OF KING'S WHARF, ANTENNA HEIGHT 75 METERS

DAY	GMT	SAT	ELEV	CFCW	LATITUDE	LONGITUDE	IT	CTS	CISO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
201	142	65	52	N-E	18 7 57.00S	178 25 24.74E	2	33	15	0.7	-1.9
*201	912	63	8	N-E	18 7 41.22S	178 25 25.62E	8	7	1	-18.1	-1.1
*201	930	65	13	N-W	18 7 55.50S	178 25 27.18E	2	17	1	-0.8	0.5
201	1000	64	73	S-E	18 7 55.62S	178 25 26.64E	2	30	14	-0.7	-0.0
*201	1056	63	72	N-W	18 7 57.66S	178 25 32.73E	3	32	12	1.3	6.0
*201	1148	64	5	S-W	18 7 56.22S	178 25 24.93E	6	10	4	-0.1	-1.8
201	1148	42	31	N-E	18 7 56.64S	178 25 25.62E	2	22	2	0.4	-1.1
*201	1532	64	11	N-E	18 7 55.58S	178 25 26.76E	2	18	8	-0.3	0.1
201	1624	42	26	N-W	18 7 55.68S	178 25 27.65E	2	22	14	-0.5	1.1
201	1718	64	65	N-W	18 7 57.54S	178 25 26.94E	2	34	13	1.3	3.3
201	1922	65	44	S-E	18 7 54.42S	178 25 25.08E	2	36	4	-1.9	-1.5
201	2114	65	22	S-W	18 7 55.80S	178 25 28.74E	2	24	5	-0.5	1.7
*201	2242	63	74	S-E	18 7 54.18S	178 25 12.65E	2	30	0	-2.1	-14.0
201	2308	64	23	N-W	18 7 55.50S	178 25 24.96E	2	22	6	-0.9	-1.7
*202	32	63	7	S-W	18 8 5.28S	178 25 26.75E	6	5	2	5.0	3.1
*202	224	42	22	S-E	18 7 57.12S	178 25 26.82E	2	25	4	0.8	0.1
*202	322	64	7	S-E	18 8 6.36S	178 25 24.42E	7	5	2	10.1	-2.3
202	408	42	15	S-W	18 7 57.42S	178 25 25.64E	2	32	15	1.1	-0.0
*202	506	64	83	S-W	18 7 55.44S	178 25 36.42E	2	31	1	2.2	0.7

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 3B-4

ARITHMETIC MEAN SOLUTION AT SUVA ANT 75 METERS

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
19	9	10	18 7 56.27S 178 25 25.88E	1.0 1.7	0.3 0.5

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15	>75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
201	912	X		X	X
201	930	X			
201	1056		X		
201	1148	X		X	
201	1532	X			
201	2242				X
202	32	X		X	
202	322	X		X	
202	506		X		

TABLE 3C-4

BY INDIVIDUAL SATELLITE - ARITHMETIC MEAN SOLUTION AT SUVA ANT 75 METERS

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	4	18 7 56.71S 178 25 26.76E	0.8 1.0	0.4 0.5
54	2	18 7 56.16S 178 25 26.79E	0.7 1.7	0.5 1.2
64	1	18 7 56.44S 178 25 25.62E		
65	3	18 7 56.48S 178 25 26.80E	0.7 1.2	0.4 0.7

TABLE 3A-5

R/V KANA KEOKI 1971 POSITIONAL DATA, SUVA, FIJI
 MOORED TO DOLPHINS AT N/E KING'S WHARF. ANTENNA HEIGHT 75 METERS.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
202	2340	63	26	S-W	18 7 45.425	178 25 33.24F	2	28	12	-1.4	1.0
*203	312	42	77	S-E	18 7 45.345	178 25 26.82F	2	34	17	-1.4	-5.5
203	416	64	37	S-E	18 7 45.005	178 25 31.24F	2	31	15	-1.4	-3.6
*203	502	42	8	S-W	18 7 45.645	178 25 25.24F	4	8	3	-1.3	-3.0
203	604	64	21	S-W	18 7 45.665	178 25 32.58F	2	27	13	-1.1	0.3
*203	752	65	76	N-E	18 7 47.645	178 25 24.65F	2	32	0	0.4	-7.3
*203	820	54	7	S-E	18 7 50.505	178 25 26.22F	3	0	0	11.7	-6.1
*203	520	63	13	N-E	18 7 48.305	178 25 32.88F	2	20	0	1.5	0.6
*203	640	65	7	N-W	18 7 42.845	178 25 25.40F	5	0	0	-4.0	-2.9
*203	1002	54	77	S-W	18 7 46.585	178 25 45.66F	3	32	1	0.2	13.4
203	1104	63	53	N-W	18 7 48.185	178 25 32.88F	2	34	17	1.4	0.6
203	1414	42	34	N-E	18 7 47.125	178 25 31.62F	2	32	14	0.7	-1.3
203	1542	64	18	N-E	18 7 48.185	178 25 42.04F	2	26	12	1.4	-0.2
203	1622	42	23	N-W	18 7 47.105	178 25 32.76F	2	27	13	0.3	0.5
203	1726	64	44	N-W	18 7 47.585	178 25 33.24F	2	34	17	0.3	1.0
203	1836	65	64	S-E	18 7 46.385	178 25 29.24F	2	36	17	-3.4	-3.0
*203	2116	63	10	S-E	18 7 45.425	178 25 34.66F	2	16	6	-1.4	2.5
203	2124	64	47	A-E	18 7 48.645	178 25 33.00F	2	15	0	1.0	0.7
203	2252	63	65	S-W	18 7 44.825	178 25 34.44F	2	32	1	-2.0	2.2
203	2312	64	17	N-W	18 7 47.345	178 25 32.76F	2	25	11	-0.2	0.5
204	220	42	25	S-E	18 7 45.185	178 25 33.00F	2	29	8	-1.6	0.7
*204	310	64	13	S-W	18 7 46.865	178 25 33.66F	2	17	1	0.1	1.4
204	404	42	32	S-W	18 7 44.525	178 25 32.46F	2	35	14	-2.3	0.2
204	514	64	57	S-W	18 7 45.785	178 25 33.00F	2	35	16	-1.0	1.1
204	704	65	28	N-E	18 7 46.685	178 25 30.00F	2	28	13	0.2	-1.4
204	850	65	25	N-W	18 7 46.385	178 25 32.68F	2	27	12	-0.4	0.6
204	912	64	34	S-E	18 7 44.645	178 25 32.68F	2	31	15	-2.2	0.3
204	1016	63	57	N-E	18 7 48.485	178 25 30.78F	2	32	13	1.7	-1.5
204	1100	64	23	S-W	18 7 45.965	178 25 31.38F	2	23	9	-0.8	-0.2
*204	1204	63	13	N-W	18 7 45.005	178 25 32.10F	2	25	9	-1.2	-0.2
*204	1342	42	9	A-E	18 7 42.785	178 25 33.00F	3	12	5	-3.0	-0.7
204	1506	42	72	N-W	18 7 49.005	178 25 37.26F	2	35	17	1.2	5.0
204	1636	64	72	N-E	18 7 47.405	178 25 26.62F	2	36	17	0.6	-3.7
*204	1824	64	10	N-W	18 7 47.285	178 25 31.38F	6	14	7	0.5	-0.0
204	1850	65	26	N-E	18 7 45.125	178 25 30.78F	2	33	15	-1.7	-1.5
204	2036	64	17	N-E	18 7 48.185	178 25 31.62F	2	20	9	1.4	-1.3
204	2204	63	45	S-E	18 7 45.005	178 25 31.02F	2	31	16	-1.8	-1.3
204	2224	64	48	A-W	18 7 48.905	178 25 33.42F	2	28	12	2.1	1.1
204	2350	63	17	S-W	18 7 44.825	178 25 32.22F	2	22	9	-2.0	-0.1
*205	126	42	7	S-E	18 7 53.345	178 25 34.66F	2	0	0	6.5	2.3
*205	310	42	76	S-E	18 7 44.405	178 25 22.56F	3	31	1	-2.4	-3.7
205	424	64	55	S-E	18 7 45.905	178 25 31.62F	2	34	10	-0.2	-1.3
*205	502	42	7	S-W	18 7 51.185	178 25 31.02F	6	0	0	4.4	-1.3
*205	614	64	14	S-W	18 7 44.945	178 25 31.66F	2	21	10	-1.0	-0.6
205	602	65	65	N-W	18 7 46.925	178 25 37.74F	2	32	15	0.1	5.5

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 3A-5

R/V KANA KEOKI 1971 POSITIONAL DATA, SUVA, FIJI
 MOORED TO DOLPHINS AT N/E KING'S WHARF. ANTENNA HEIGHT 75 METERS.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
*205	822	54	11	S-E	18 7 47.285	178 25 34.08F	2	14	7	0.5	1.0
205	928	63	21	N-E	18 7 49.485	178 25 31.62F	2	24	12	1.7	-0.4
205	1004	54	65	S-W	18 7 45.965	178 25 31.36F	2	35	16	-0.8	1.1
205	1114	63	37	N-W	18 7 49.005	178 25 33.76F	2	32	16	1.2	1.1
205	1412	42	37	N-E	18 7 48.245	178 25 30.48F	2	33	16	1.4	-1.4
205	1550	64	28	N-E	18 7 49.865	178 25 31.96F	2	31	14	3.1	-0.7
205	1618	42	21	N-W	18 7 47.345	178 25 32.02F	2	24	12	0.5	0.7
205	1736	64	30	S-E	18 7 47.345	178 25 33.24F	2	31	15	0.5	1.0
*205	1804	65	6	S-E	18 7 45.785	178 25 32.12F	6	10	4	-1.0	0.4
*205	1948	65	71	S-W	18 7 54.725	178 27 25.76F	7	32	3	7.0	11.5
205	2114	63	16	S-E	18 7 46.085	178 25 31.24F	2	22	9	-0.7	1.0
205	2134	64	64	N-E	18 7 47.825	178 25 30.24F	2	25	0	1.0	-2.0
205	2300	63	68	S-W	18 7 46.265	178 25 33.76F	2	32	12	-0.5	1.1
*205	2320	54	12	N-W	18 7 46.085	178 25 31.26F	2	17	8	-0.7	-1.0
205	214	42	27	S-E	18 7 44.465	178 25 32.36F	2	30	14	-2.3	0.1
205	338	64	21	S-E	18 7 46.565	178 25 32.22F	2	24	4	-0.2	-0.1
205	402	42	29	S-W	18 7 44.465	178 25 32.24F	2	30	14	-2.3	1.0
205	524	64	39	S-W	18 7 46.425	178 25 34.02F	2	32	16	-0.2	1.7
205	714	65	42	N-E	18 7 46.625	178 25 30.12F	2	31	14	-2.2	-2.7
205	802	65	14	N-W	18 7 46.385	178 25 31.92F	2	27	10	-0.4	-0.4
205	918	64	45	S-E	18 7 44.385	178 25 37.74F	2	27	11	-0.4	0.5
205	1024	63	74	N-E	18 7 49.185	178 25 24.56F	2	31	0	1.4	-7.3
207	812	65	45	N-W	18 7 47.105	178 25 33.66F	2	30	11	0.3	1.4
207	936	63	30	N-E	18 7 47.285	178 25 31.80F	2	27	11	0.5	-0.5
207	1012	64	50	S-W	18 7 47.105	178 25 32.22F	2	30	14	0.3	-0.1
207	1122	63	26	N-W	18 7 45.525	178 25 32.22F	2	25	14	-0.3	-0.1
207	1428	42	41	N-E	18 7 47.705	178 25 30.78F	2	33	14	0.0	-1.5
207	1606	64	41	N-E	18 7 48.185	178 25 30.40F	2	32	4	1.4	-1.7
207	1620	42	19	N-W	18 7 48.425	178 25 32.10F	2	16	5	1.6	-0.2
207	1746	64	20	N-W	18 7 47.105	178 25 33.12F	2	27	12	0.3	0.4
*207	1814	65	14	S-E	18 7 44.765	178 25 32.22F	2	24	11	-2.0	-0.1
207	1958	65	64	S-W	18 7 46.325	178 25 36.18F	2	38	17	-0.5	3.9

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

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TABLE 3B-5

ARITHMETIC MEAN SOLUTION AT SUVA ANT 75 METERS

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
77	21	56	18 7 46.755 178 25 32.27E	1.3 1.6	0.2 0.3

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
203	312		X	
203	502	X		
203	752		X	
203	820	X		X
203	920	X		
203	940	X		
203	1002		X	X
203	2109	X		
204	110	X		
204	1204	X		
204	1342	X		
204	1826	X	X	
204	128	X		
205	310		X	
205	500	X	X	
205	614	X		
205	822	X		
205	1804	X	X	X
205	1948	X	X	
207	1814	X		

TABLE 3C-5

ARITHMETIC MEAN SOLUTION BY SATELLITE AT SUVA ANT 75 METERS

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	11	18 7 46.63E 178 25 32.59E	1.6 1.9	0.5 0.5
54	10	18 7 46.455 178 25 32.63E	1.6 1.9	0.5 0.6
63	13	18 7 46.425 178 25 32.63E	1.6 1.7	0.4 0.5
64	13	18 7 46.825 178 25 32.63E	1.6 1.7	0.4 0.5
65	9	18 7 46.315 178 25 32.84E	1.6 1.9	0.5 0.6

TABLE 3A-6

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R/V KANA KEOKI 1971 POSITIONAL DATA, SUVA, FIJI
MOORED TO DOLPHINS AT N/E KING'S WHARF. ANTENNA HEIGHT 54 METERS.

DAY	GMT	SAT	ELEV	GECM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF SEC)	
										LATITUDE	LONGITUDE
207	2124	63	24	S-E	18 7 45.785	178 25 32.34E	2	28	13	-1.0	0.1
207	2310	63	33	S-W	18 7 45.905	178 25 32.22E	2	24	7	-0.9	0.0
208	212	42	30	S-E	18 7 44.285	178 25 32.89E	2	28	12	-2.5	0.2
208	248	64	31	S-E	18 7 45.785	178 25 32.88E	2	28	6	-1.0	0.2
208	514	64	26	S-W	18 7 45.245	178 25 31.62E	2	29	13	-1.5	-0.4
208	724	65	64	N-E	18 7 47.345	178 25 32.40E	2	32	15	0.6	-0.4
208	850	63	6	N-E	18 7 45.045	178 25 30.16E	2	16	6	21.1	-1.8
208	1014	64	9	N-W	18 7 40.425	178 25 31.92E	2	12	6	-4.1	-0.5
208	1032	63	70	N-W	18 7 49.665	178 25 33.24E	2	34	17	1.0	1.0
208	1108	64	12	S-W	18 7 46.695	178 25 30.60E	2	18	6	-0.1	-1.6
208	1336	42	12	N-E	18 7 48.605	178 25 32.88E	2	19	4	1.0	0.2
208	1512	64	15	N-E	18 7 48.145	178 25 31.80E	2	22	10	-0.6	-0.4
208	1656	64	53	N-W	18 7 48.065	178 25 32.22E	2	33	1	1.1	0.0
208	1910	65	54	S-E	18 7 45.605	178 25 31.92E	2	33	1	-1.1	-1.2
208	2042	64	30	N-E	18 7 47.525	178 25 31.92E	2	32	15	0.9	-0.3
208	2102	65	17	S-W	18 7 46.565	178 25 31.44E	2	17	7	-0.2	-0.4
208	2220	63	12	S-E	18 7 46.025	178 25 31.20E	17	13	0	2.3	32.0
208	2234	64	28	N-W	18 7 47.225	178 25 32.10E	2	20	6	0.6	-0.1
209	10	63	7	S-W	18 7 48.305	178 25 32.22E	4	0	0	2.2	-2.8
209	122	42	4	S-E	18 7 51.025	178 25 30.60E	4	7	4	6.8	-1.6
209	190	64	10	S-E	18 7 45.425	178 25 34.70E	4	0	0	-1.3	2.0
209	444	64	70	S-W	18 7 45.605	178 25 32.34E	3	32	1	-1.1	0.1
209	636	65	22	N-E	18 7 47.525	178 25 31.64E	2	26	12	0.8	-0.5
209	822	65	30	N-W	18 7 46.505	178 25 33.24E	2	27	10	-0.2	1.0
209	944	63	44	N-E	18 7 48.185	178 25 32.10E	2	34	16	1.4	-0.1
209	1014	64	38	S-W	18 7 46.605	178 25 32.22E	2	33	15	0.1	0.0
209	1132	63	18	N-W	18 7 44.205	178 25 32.40E	2	24	11	0.2	0.2
209	1224	42	45	N-E	18 7 47.405	178 25 32.64E	2	33	16	0.2	-0.6
209	1606	63	60	N-E	18 7 48.485	178 25 30.78E	2	31	1	1.7	-1.4
209	1756	63	13	N-W	18 7 45.665	178 25 32.70E	2	16	0	-1.1	0.5
209	1922	65	22	S-E	18 7 45.665	178 25 32.64E	2	30	14	-1.1	-0.2
209	1954	64	9	N-E	18 7 44.465	178 25 31.02E	6	12	6	-0.2	1.2
209	2010	64	45	S-E	18 7 46.085	178 25 33.12E	2	34	14	-0.7	0.2
209	2112	64	39	N-E	18 7 45.185	178 25 33.76E	2	32	15	-1.5	0.6
209	2318	63	23	S-W	18 7 45.425	178 25 33.60E	2	26	7	-1.3	0.4
210	276	42	33	S-E	18 7 45.065	178 25 32.10E	2	31	15	-1.7	-0.1
210	544	64	19	S-W	18 7 45.965	178 25 31.26E	4	22	3	-0.4	-0.4
210	734	65	66	N-E	18 7 46.145	178 25 45.30E	2	29	0	-0.4	13.1
210	856	63	16	N-E	18 7 48.005	178 25 32.40E	2	15	1	1.3	1.2
210	1024	64	73	S-E	18 7 46.205	178 25 34.80E	2	27	1	-0.5	2.4
210	1042	63	49	N-W	18 7 48.245	178 25 31.60E	2	32	14	1.6	-0.3
210	1112	64	8	S-W	18 7 50.645	178 25 32.22E	2	0	0	3.6	3.0
210	1330	42	14	N-E	18 7 45.245	178 25 33.60E	2	21	10	-1.5	1.2
210	1516	42	54	N-W	18 7 48.365	178 25 33.66E	2	29	8	1.6	1.5
210	1706	64	36	N-W	18 7 47.585	178 25 33.12E	2	33	15	0.8	0.0

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 3A-6

R/V KANA KEOKI 1971 POSITIONAL DATA, SUVA, FIJI
MOORED TO DOLPHINS AT N/E KING'S WHARF. ANTENNA HEIGHT 54 METERS.

DAY	GMT	SAT	ELEV	GECM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF SEC)	
										LATITUDE	LONGITUDE
210	1520	65	73	S-E	18 7 45.425	178 25 26.74E	3	35	0	-1.3	-3.5
210	2046	63	11	S-E	18 7 46.685	178 25 33.78E	2	18	9	0.2	1.0
210	2110	65	11	S-W	18 7 44.405	178 25 31.14E	2	15	7	-2.3	-1.1
211	116	42	6	S-E	18 7 46.505	178 25 35.88E	6	11	4	-0.2	3.7
211	300	42	73	S-E	18 7 45.605	178 25 34.02E	2	33	1	-1.1	1.8
211	454	63	48	S-W	18 7 45.405	178 25 32.22E	2	35	17	-0.8	0.0
211	646	65	34	N-E	18 7 47.405	178 25 31.26E	2	29	13	0.2	-0.0
211	822	64	26	S-E	18 7 45.005	178 25 32.04E	2	19	2	-1.7	-0.2
211	952	63	64	N-E	18 7 48.005	178 25 31.80E	2	25	12	2.2	-0.4
211	1018	64	29	S-W	18 7 46.265	178 25 31.52E	2	28	10	-0.5	-0.3
211	1140	63	11	N-W	18 7 46.365	178 25 32.24E	2	16	6	-3.5	1.0
211	1420	42	50	N-E	18 7 48.585	178 25 32.44E	2	33	16	0.2	0.3
211	1634	42	15	N-W	18 7 46.205	178 25 31.80E	2	23	11	-0.5	-0.4
211	1726	64	52	N-E	18 7 50.645	178 25 1.14E	10	0	0	10.2	-0.1
211	1828	64	7	N-W	18 7 45.245	178 25 26.58E	6	3	1	-1.5	-2.6
211	1832	65	32	S-E	18 7 43.645	178 25 32.10E	2	34	16	-2.1	-0.1
211	1956	64	13	N-E	18 7 47.165	178 25 33.00E	2	20	3	0.4	0.0
211	2018	65	31	S-W	18 7 45.785	178 25 34.02E	2	35	17	-1.0	1.8
211	2142	64	59	N-W	18 7 48.305	178 25 32.24E	2	18	0	2.2	1.0
212	206	42	37	S-E	18 7 45.245	178 25 32.44E	6	0	0	-1.5	0.4
212	352	42	21	S-W	18 7 44.745	178 25 32.10E	2	27	13	-2.0	-0.1
212	412	63	64	S-E	18 7 46.645	178 25 32.88E	2	16	2	0.2	0.2
212	554	63	11	S-W	18 7 46.305	178 25 31.14E	2	17	8	-0.2	-0.4
212	604	63	24	N-E	18 7 45.185	178 25 32.34E	2	29	14	1.4	0.1
212	630	64	71	S-W	18 7 45.185	178 25 26.10E	2	23	1	-1.6	-0.1
212	1050	63	34	N-W	18 7 46.865	178 25 30.76E	2	30	14	0.1	-1.8
212	1118	64	7	S-W	18 7 43.665	178 25 36.84E	3	0	0	26.0	4.6
212	1328	42	16	N-E	18 7 50.365	178 25 31.52E	2	23	10	7.6	-0.3
212	1512	42	49	N-W	18 7 44.125	178 25 32.88E	2	33	16	1.4	0.1
212	1532	64	33	N-E	18 7 47.105	178 25 32.34E	2	30	15	0.4	0.1
212	1716	64	25	N-W	18 7 46.205	178 25 32.54E	2	24	11	-0.5	0.4
212	1746	65	11	S-E	18 7 44.545	178 25 33.24E	2	19	8	-2.1	1.0
212	1930	65	74	S-W	18 7 45.545	178 25 35.46E	2	30	16	-1.2	3.7
212	2050	64	35	N-E	18 7 48.125	178 25 31.80E	2	15	0	-1.4	-0.4
213	112	42	23	S-E	18 7 47.225	178 25 32.88E	5	14	7	0.5	0.2
213	246	42	67	N-E	18 7 45.845	178 25 31.42E	2	34	15	-0.0	1.2
213	318	64	25	S-E	18 7 46.385	178 25 22.70E	2	28	14	-0.4	0.6
213	504	64	32	S-W	18 7 44.265	178 25 32.22E	2	32	15	-0.3	0.0
213	656	65	52	N-E	18 7 47.705	178 25 30.04E	2	31	14	1.0	-2.1
213	818	63	7	N-E	18 7 52.265	178 25 36.04E	3	0	0	6.5	3.7
213	834	64	17	S-E	18 7 45.185	178 25 32.70E	2	33	16	-1.0	0.2
213	1002	63	73	N-E	18 7 43.665	178 25 34.74E	15	0	0	2.2	2.5
213	1026	64	22	S-W	18 7 47.345	178 25 31.56E	2	20	9	0.6	-0.6
213	1150	63	7	N-W	18 7 45.125	178 25 27.48E	2	0	0	-1.6	-4.7
213	1418	42	55	N-E	18 7 47.525	178 25 31.64E	2	33	14	0.8	-0.5
213	1444	64	11	N-E	18 7 49.025	178 25 32.04E	2	17	7	2.3	-0.2

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

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TABLE 3A-6 (CONT.)

R/V KANA KENKI 1971 POSITIONAL DATA, SUVA, FIJI
MOORED TO DOLPHINS AT N/E KING'S WHARF. ANTENNA HEIGHT 54 METERS.

97

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	C150	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
*213	1600	42	14	N-W	18 7 45.90S	178 25 32.10E	2	20	9	-0.8	-0.1
213	1628	64	65	N-W	18 7 48.24S	178 25 33.36E	2	36	17	1.5	1.2
213	1842	65	46	S-E	18 7 44.64S	178 25 30.50E	2	36	12	-2.1	-1.1
213	2000	54	18	N-E	18 7 48.66S	178 25 32.10E	2	25	11	1.9	-0.1
213	2028	65	21	S-W	18 7 46.20S	178 25 34.03E	2	28	12	-0.5	1.2
213	2144	54	45	N-W	18 7 49.48S	178 25 32.34E	2	27	11	1.7	0.1
*213	2236	63	5	S-W	18 7 50.76S	178 25 32.10E	6	11	4	4.2	-2.1
214	202	42	40	S-E	18 7 45.12S	178 25 32.70E	2	33	16	-1.6	0.5
*214	232	64	7	S-E	18 7 52.92S	178 25 34.74E	3	4	1	0.2	2.5
214	350	42	19	S-W	18 7 46.08S	178 25 30.00E	2	26	12	-0.7	-1.3
214	414	64	68	S-W	18 7 45.74S	178 25 35.24E	2	33	1	-0.0	3.1
214	606	65	16	N-E	18 7 47.04S	178 25 31.60E	2	33	10	0.3	-0.5
214	746	54	12	S-E	18 7 42.50S	178 25 35.64E	2	19	9	-4.1	3.7
*214	912	63	34	N-E	18 7 47.10S	178 25 33.12E	2	30	11	0.4	0.2
214	932	54	42	S-W	18 7 45.00S	178 25 31.14E	2	30	8	-1.7	-1.1
214	1100	63	24	N-W	18 7 46.28S	178 25 31.60E	2	28	13	-0.7	-0.5
214	1324	42	17	N-E	18 7 47.52S	178 25 32.54E	2	24	2	0.8	0.4
214	1510	42	45	N-W	18 7 43.16S	178 25 32.84E	2	34	16	1.5	0.7
214	1540	64	45	N-E	18 7 47.16S	178 25 31.80E	2	35	15	0.4	-0.4
214	1728	64	16	N-W	18 7 45.66S	178 25 31.60E	2	24	11	-1.1	-0.1
214	1756	65	18	S-E	18 7 45.12S	178 25 33.04E	2	27	12	-1.6	0.8
214	1940	65	52	S-W	18 7 46.44S	178 25 34.04E	2	30	19	-0.1	1.2
214	2054	54	67	N-E	18 7 48.60S	178 25 29.54E	2	34	15	1.3	-2.1

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 3B-6

ARITHMETIC MEAN SOLUTION AT SUVA ANT 54 METERS

NP	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
114	33	81	18 7 46.74S 178 25 32.20E	1.5 1.5	0.2 0.2

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
208	850	X		
208	914	X		
208	1108	X		
208	1316	X		
208	2220	X		
209	10	X		
209	122	X		
209	300	X		
209	1756	X		
209	1954	X		
210	734	X		
210	1112	X		
210	1330	X		
210	2046	X		
210	2110	X		
211	116	X		
211	1140	X		
211	1628	X		
211	1804	X		
211	1956	X		
212	226	X		
212	654	X		
212	1114	X		
212	1746	X		
213	112	X		
213	819	X		
213	1002	X		
213	1150	X		
213	1444	X		
213	1606	X		
213	2331	X		
214	212	X		
214	748	X		

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TABLE 3C-6

BY INDIVIDUAL SATELLITE - ARITHMETIC MEAN SOLUTION AT SUVA				ANT 54 METERS	
SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)	
42	16	18 7 46.975 178 25 32.46E	2.4 0.8	0.6 0.2	
54	15	18 7 46.895 178 25 32.44E	2.4 0.9	0.6 0.2	
63	17	18 7 47.005 178 25 32.43E	2.3 0.8	0.6 0.2	
64	15	18 7 46.885 178 25 32.44E	2.4 0.9	0.6 0.2	
65	18	18 7 47.025 178 25 32.41E	2.2 0.8	0.5 0.2	

TABLE 3A-7

R/V KANA KEOKI 1572 POSITIONAL DATA, SUVA, FIJI
MOORED AT THE 500 FOOT MARK AT KING'S WHARF.

											DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
DAY	GMT	SAT	ELEV	FROM	LATITUDE	LONGITUDE	I"	CTS	CTS0		LATITUDE	LONGITUDE
359	546	42	82	N-E	18 7 59.045	178 25 24.12E	12	0	0		-0.3	-24.4
359	720	54	7	N-E	18 7 59.445	178 25 24.12E	3	0	0		-1.5	-1.2
359	738	42	7	N-W	18 7 59.605	178 25 22.98E	8	0	0		0.7	-2.2
359	904	64	68	N-W	18 7 59.605	178 25 22.98E	7	0	0		-0.5	-2.8
359	1054	63	7	N-W	18 7 59.605	178 25 22.98E	3	0	0		1.6	-4.7
359	1144	63	36	S-E	18 7 59.605	178 25 22.98E	2	30	4		-2.1	-0.1
359	1330	63	20	S-W	18 7 59.605	178 25 22.98E	2	23	1		0.0	-0.2
359	1600	64	13	S-E	18 7 59.605	178 25 22.98E	2	18	7		-2.8	1.7
359	1738	42	64	S-E	18 7 59.605	178 25 22.98E	2	21	1		-0.2	2.3
359	1922	42	10	S-W	18 7 59.605	178 25 22.98E	2	13	6		-5.3	-1.9
359	2038	65	12	N-E	18 7 59.605	178 25 22.98E	2	13	6		1.7	-0.1
359	2054	64	69	S-E	18 7 59.605	178 25 22.98E	2	25	4		-0.5	2.2
359	2222	65	46	N-W	18 7 59.605	178 25 22.98E	2	31	15		-0.2	1.5
359	2204	63	18	N-E	18 7 59.605	178 25 22.98E	2	23	2		2.8	-1.0
360	54	63	46	N-W	18 7 59.605	178 25 22.98E	2	33	10		0.3	-1.1
360	454	42	30	N-E	18 7 59.605	178 25 22.98E	2	31	15		0.3	-3.6
360	514	64	70	N-E	18 7 59.605	178 25 22.98E	2	22	0		0.6	-3.0
360	642	42	27	N-W	18 7 59.605	178 25 22.98E	2	30	14		0.4	0.3
360	702	64	10	N-W	18 7 59.605	178 25 22.98E	3	11	5		-2.1	-1.0
360	814	64	34	N-E	18 7 59.605	178 25 22.98E	2	32	15		0.9	-0.7
360	1000	64	23	N-W	18 7 59.605	178 25 22.98E	2	25	2		-0.2	-1.0
360	1056	63	12	S-E	18 7 59.605	178 25 22.98E	3	16	8		0.5	0.3
360	1240	63	57	S-W	18 7 59.605	178 25 22.98E	2	30	0		0.1	0.3
360	1640	42	21	S-E	18 7 59.605	178 25 22.98E	2	27	13		-0.7	0.3
360	1656	64	54	S-E	18 7 59.605	178 25 22.98E	2	32	15		-1.8	0.9

* = FIX NET USED FOR COMPUTATION OF THE MEAN

TABLE 3B-7

ARITHMETIC MEAN SOLUTION AT SUVA, 500 FOOT MARK.

NO	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
25	10	15	18 7 59.915 178 25 25.28E	1.1 1.4	0.3 0.4

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15	ITERATIONS >75	DEVIATION >10 SECS OF ARC
359	548		X	X
359	720	X		
359	738	X		
359	904		X	X
359	1054	X		
359	1600	X		
359	1922	X		
359	2038	X		
360	702	X		
360	1056	X		

TABLE 3C-7

BY SATELLITE --- ARITHMETIC MEAN SOLUTION AT SUVA, 500 FOOT MARK.

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	4	18 7 59.885 178 25 25.87E	0.5 1.2	0.1 0.6
54	3	18 7 59.885 178 25 25.87E	0.5 1.5	0.2 0.9
63	5	18 7 59.785 178 25 26.20E	0.5 1.3	0.2 0.4
64	2	18 7 59.975 178 25 26.13E	0.3 2.1	0.2 1.3

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TABLE 3A-E

R/V KANA KEOKI 1972 POSITIONAL DATA, SUVA, FIJI
MOORED ALONGSIDE DOLPHINS AT THE GOVERNMENT SLIPWAY.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
360	1824	42	37	S-W	18 7 46.26S	178 25 32.34E	2	32	15	-0.4	-0.1
*360	1846	64	14	S-W	18 7 45.62S	178 25 31.84E	2	22	10	-1.0	-1.0
360	1856	54	25	S-E	18 7 45.34S	178 25 32.22E	2	25	14	-1.3	-0.2
360	2134	65	61	N-E	18 7 46.18S	178 25 28.62E	2	31	14	0.3	-3.0
*360	2322	65	9	N-W	18 7 41.20S	178 25 31.34E	5	12	5	-3.4	-1.1
361	34	63	70	N-E	18 7 47.22S	178 25 30.12E	2	31	14	0.6	-2.3
*361	152	63	11	N-W	18 7 45.00S	178 25 30.06E	2	11	5	-1.6	-2.4
*361	402	42	7	N-E	18 7 25.38S	178 25 27.64E	4	4	1	-21.3	-4.6
361	422	64	26	N-E	18 7 47.70S	178 25 31.80E	2	29	14	1.1	-0.4
361	546	42	72	N-W	18 7 47.14S	178 25 40.00E	2	31	0	0.7	8.1
361	626	64	31	N-W	18 7 47.38S	178 25 33.24E	2	31	0	0.0	0.0
*361	724	54	10	N-E	18 7 49.66S	178 25 30.34E	2	16	7	2.0	-2.1
361	808	54	65	N-W	18 7 48.54S	178 25 33.78E	2	34	1	1.2	1.1
361	1108	65	17	S-W	18 7 44.58S	178 25 31.64E	2	26	12	-2.1	-0.0
361	1156	63	53	S-E	18 7 45.66S	178 25 31.92E	2	31	15	-1.2	-0.5
*361	1340	63	13	S-W	18 7 46.08S	178 25 30.72E	2	17	9	-0.6	-1.7
361	1608	64	20	S-E	18 7 46.74S	178 25 32.54E	2	27	13	0.1	0.1
361	1730	42	72	S-E	18 7 46.14S	178 25 33.40E	2	32	1	-0.5	1.0
361	1754	64	41	S-W	18 7 46.02S	178 25 32.64E	2	33	14	0.1	0.1
*361	1718	42	9	S-W	18 7 49.90S	178 25 31.02E	4	11	4	2.3	-0.5
361	2048	65	21	N-E	18 7 47.22S	178 25 32.10E	2	26	12	0.6	-2.3
361	2232	65	31	N-W	18 7 46.30S	178 25 33.42E	2	26	11	-0.1	1.0
361	2316	63	24	N-E	18 7 45.84S	178 25 32.34E	2	30	14	-0.9	-2.1
362	102	63	32	N-W	18 7 44.20S	178 25 33.00E	2	32	15	-0.4	0.6
362	452	42	33	N-E	18 7 47.46S	178 25 32.22E	2	31	14	-0.4	-0.2
*362	518	63	40	N-W	18 7 46.55S	178 25 34.14E	2	33	0	-0.1	3.7
362	638	42	25	N-W	18 7 46.20S	178 25 31.12E	2	28	14	-0.4	2.7
*362	708	64	7	N-W	18 7 39.00S	178 25 26.64E	6	0	0	-7.7	-5.4
362	816	54	44	N-E	18 7 48.10S	178 25 30.72E	2	33	14	1.5	-1.7
362	836	65	20	S-E	18 7 47.52S	178 25 32.46E	2	25	12	0.0	0.0
362	1004	54	17	N-W	18 7 46.32S	178 25 32.22E	2	24	11	-0.3	-0.2
362	1022	55	44	S-W	18 7 49.20S	178 25 31.54E	2	29	13	-0.4	-0.0
362	1104	63	15	S-E	18 7 47.70S	178 25 32.22E	2	24	11	1.1	-2.2
362	1250	63	39	S-W	18 7 46.92S	178 25 32.34E	2	28	11	0.3	-2.1
362	1636	42	23	S-E	18 7 45.78S	178 25 32.34E	2	28	13	-0.2	-0.1
*362	1706	63	78	S-E	18 7 46.32S	178 25 32.76E	3	32	1	-0.3	0.3
362	1922	42	33	S-W	18 7 46.02S	178 25 32.10E	2	31	15	-0.6	-0.3
*362	1856	64	8	S-W	18 7 51.06S	178 25 31.56E	7	10	4	4.4	-0.0
362	2002	54	33	S-E	18 7 45.12S	178 25 31.56E	2	32	15	-1.5	-0.2
*362	2144	65	82	N-W	18 7 44.52S	178 25 32.00E	6	28	1	-2.1	39.6

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 3B-E

ARITHMETIC MEAN SOLUTION AT SUVA, AT DOLPHINS.

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
40	12	28	18 7 46.65S 178 25 32.45E	0.9 1.9	0.2 0.4

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
360	1846	X		
360	2322	X	X	
361	152	X	X	
361	402	X		X
361	724	X		
361	1140	X		
361	1018	X		
362	518		X	
362	708	X	X	
362	1706		X	
362	1856	X	X	X
362	2144		X	

TABLE 3C-E

BY SATELLITE --- ARITHMETIC MEAN SOLUTION AT SUVA, AT DOLPHINS.

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	7	18 7 46.46S 178 25 33.72E	0.7 3.0	0.3 1.1
54	5	18 7 46.68S 178 25 34.32E	0.7 3.5	0.3 1.6
63	6	18 7 46.53S 178 25 33.99E	0.7 3.2	0.3 1.1
64	4	18 7 46.80S 178 25 34.62E	0.7 4.0	0.3 2.0
65	6	18 7 46.53S 178 25 33.99E	0.7 3.2	0.3 1.3

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TABLE 4A-1

R/V MAHI 1970 POSITIONAL DATA, RABAU, NEW BRITAIN
MOORED AT DOCK

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
216	1400	54	14		4 11 58.14S	152 10 14.76E	3	21	10	-3.3	-3.2
216	1522	42	56		4 12 0.54S	152 10 19.92E	2	33	16	-0.2	1.9
216	1710	42	11		4 12 3.24S	152 10 14.52E	2	17	9	1.9	-3.5
216	1748	64	28		4 12 0.36S	152 10 18.42E	2	29	12	-1.1	0.4
216	1534	64	25		4 12 0.84S	152 10 15.54E	2	30	15	-0.6	-2.4
216	2344	54	27		4 12 2.10S	152 10 20.16E	2	30	15	0.7	2.2
217	132	54	25		4 12 3.30S	152 10 15.84E	2	28	13	1.9	-2.1

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 4B-1

ARITHMETIC MEAN SOLUTION AT RABAU

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
7	2	5	4 12 1.43S 152 10 17.08E	1.2 2.2	0.6 1.0

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >7%	ITERATIONS >5	DEVIATION >10 SECS OF ARC
216	1400	X		
216	1710	X		

TABLE 4C-1

ARITHMETIC MEAN SOLUTION BY SATELLITE AT RABAU

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	1	4 12 0.54S 152 10 19.92E		
54	2	4 12 1.32S 152 10 20.04E	1.1 0.2	0.3 0.1
64	2	4 12 1.32S 152 10 20.04E	1.1 0.2	0.9 0.1

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TABLE 5A-1

R/V NAH 1970 POSITIONAL DATA, GUAM, TRUST TERRITORY
MOORED AT THE DILLINGHAM PIER

DAY	GMT	SAT	ELFV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
304	2258	64	15		13 27 45.37N	144 39 53.04E	2	24	5	2.7	0.4
305	228	65	22		13 27 39.06N	144 39 54.16E	2	25	11	-2.7	1.7
305	412	65	30		13 27 40.08N	144 39 52.44E	2	26	14	-1.7	-0.2
305	510	63	20		13 27 42.72N	144 39 50.66E	2	26	12	0.1	2.0
305	656	63	15		13 27 41.74N	144 39 52.68E	2	28	4	-0.7	0.1
305	716	64	56		13 27 44.22N	144 39 50.44E	2	23	7	1.6	-2.2
310	116	64	50		13 27 45.72N	144 39 52.80E	4	32	13	3.1	0.2
310	200	65	17		13 27 40.58N	144 39 54.42E	2	27	2	-2.0	1.8
310	440	63	15		13 27 56.10N	144 39 14.64E	2	13	0	13.5	-17.9
310	624	64	77		13 27 42.58N	144 39 49.76E	8	18	1	1.3	-43.0
310	624	42	31		13 27 42.06N	144 39 54.00E	2	31	14	-0.6	1.4
310	1110	42	23		13 27 41.66N	144 39 52.56E	2	28	4	-0.4	-0.1
310	1256	64	67		13 27 41.56N	144 39 51.60E	2	35	17	-1.1	-1.0
310	1328	65	8		13 27 39.18N	144 39 53.04E	8	11	4	-3.5	0.4
310	1512	65	66		13 27 43.14N	144 39 48.44E	2	38	0	0.5	-4.1
310	1628	63	7		13 27 39.12N	144 39 50.52E	13	0	0	-3.5	6.3
310	1704	65	7		13 27 17.62N	144 39 53.10E	6	0	0	-23.0	0.5
310	1942	63	7		13 27 39.98N	144 39 48.18E	1	0	0	-3.8	-4.4
310	1956	64	11		13 27 41.70N	144 39 46.26E	3	18	8	-0.9	-3.4
310	2050	42	14		13 27 46.20N	144 39 53.74E	2	20	2	3.4	0.7
310	2234	42	51		13 27 44.04N	144 39 52.44E	2	34	16	1.4	-0.2

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 5B-1

ARITHMETIC MEAN SOLUTION AT GUAM

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
21	8	13	13 27 42.63N 144 39 52.61E	1.8 1.7	0.5 0.5

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
310	440			X
310	624			X
310	1328	X	X	
310	1428	X	X	
310	1704	X	X	X
310	1742	X		
310	1938	X		
310	2050	X		

TABLE 5C-1

ARITHMETIC MEAN SOLUTION BY SATELLITE AT GUAM

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	3	13 27 42.66N 144 39 51.00E	1.2 0.9	0.7 0.5
54	1	13 27 42.06N 144 39 54.00E		
63	2	13 27 41.57N 144 39 53.28E	0.1 1.0	0.1 0.7
64	3	13 27 42.66N 144 39 53.00E	1.2 0.9	0.7 0.5
65	4	13 27 43.05N 144 39 52.34E	1.3 1.5	0.5 0.7

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TABLE 5A-2

R/V NAHI 1970 POSITIONAL DATA, GUAM, TRUST TERRITORY
MOORED AT THE DILLINGHAM PIER

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	C150	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
251	722	65	20		13 27 40.74N	144 39 52.68E	3	29	14	-1.5	-0.5
261	900	63	66		13 27 43.02N	144 39 55.62E	3	31	0	0.9	2.4
266	228	42	16		13 27 44.04N	144 39 52.80E	5	13	0	1.9	-0.4
266	304	44	35		13 27 44.28N	144 39 52.92E	2	33	19	2.1	-0.1
266	450	64	22		13 27 44.46N	144 39 51.79E	2	27	9	2.1	-1.4
266	518	65	39		13 27 40.74N	144 39 53.89E	2	35	17	-1.5	0.7
266	704	65	23		13 27 39.96N	144 39 52.44E	2	31	15	-2.2	-0.9

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 5B-2

ARITHMETIC MEAN SOLUTION AT GUAM

NF	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
7	1	6	13 27 42.20N 144 39 53.22E	2.0 1.4	0.9 0.6

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
266	228		x	

TABLE 5C-2

ARITHMETIC MEAN SOLUTION BY SATELLITE AT GUAM

SATELLITE NUMBER	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
63	1	13 27 43.02N 144 39 55.62E		
64	2	13 27 43.45N 144 39 54.27E	0.9 1.9	0.4 1.3
65	3	13 27 43.92N 144 39 53.44E	0.8 2.0	0.5 1.1

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TABLE 6A-1

R/V MAHI 1970 POSITIONAL DATA, MAJURO, MARSHALL ISLANDS
MOORED AT THE 'T WHARF'

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
27R	232R	42	22		7 6 14.34N	171 22 9.18E	3	27	12	-4.6	-7.4
*27R	1632	53	8		7 6 13.03N	171 22 17.58E	6	6	2	-6.7	1.0
27R	175R	54	24		7 6 17.88N	171 22 15.44E	2	30	14	-1.1	2.9
27R	1944	54	2R		7 6 19.92N	171 22 17.64E	2	30	14	0.9	1.1
*27R	2050	42	8		7 6 25.23N	171 22 23.16E	6	R	3	6.2	6.6
27R	2232	42	71		7 6 23.42N	171 22 20.10E	2	35	17	4.8	3.5

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 6B-1

ARITHMETIC MEAN SOLUTION AT MAJURO

NP	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
E	2	4	7 6 18.99N 171 22 16.59E	4.0 5.0	2.0 2.5

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
27R	1632	X	X	
27R	2050	X	X	

TABLE 6C-1

ARITHMETIC MEAN SOLUTION BY SATELLITE AT MAJURO

SATELLITE NUMBER	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	2	7 6 19.08N 171 22 14.64E	6.7 7.7	4.7 5.5
54	2	7 6 19.39N 171 22 14.64E	6.7 7.7	4.7 5.5

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TABLE 7A-1

R/V KANA KEOKI 1971 POSITIONAL DATA, PONAPE, CAROLINE ISLANDS
MOORED AT THE MAIN DOCK

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	1Y	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
146	428	54	25	N-W	6 58 43.26N	158 12 0.54E	2	0	0	-1.5	-1.4
146	500	63	20	S-W	6 58 45.30N	158 12 1.20E	2	0	0	1.2	-0.8
146	510	42	35	S-W	6 58 45.06N	158 12 3.12E	2	0	0	0.3	1.2
147	206	65	22	S-W	6 58 43.52N	158 12 2.76E	2	0	0	-0.4	0.8
147	226	63	11	S-E	6 58 47.46N	158 12 4.50E	6	0	0	-2.7	2.5
147	334	54	72	N-W	6 58 44.40N	158 12 3.00E	2	0	0	-0.3	1.0
147	410	63	56	S-W	6 58 44.58N	158 12 3.30E	30	0	0	-0.2	1.3
147	1022	64	60	S-W	6 58 45.36N	158 12 3.00E	2	32	0	0.6	1.0
147	1208	65	32	N-E	6 58 43.44N	158 12 0.78E	2	34	16	-1.3	-1.2
147	1354	65	28	N-W	6 58 44.34N	158 12 3.64E	2	33	16	-0.4	-2.8
147	1416	63	10	N-E	6 58 47.34N	158 12 0.24E	3	15	7	4.6	-1.7
147	1506	54	78	S-E	6 58 45.72N	158 11 55.22E	2	34	18	1.0	-2.7
147	1600	63	60	N-W	6 58 45.30N	158 12 3.12E	2	32	1	0.6	1.2
147	1654	54	7	S-W	6 58 44.66N	158 11 55.14E	8	0	0	4.2	-3.4
147	1550	42	40	N-E	6 58 44.40N	158 12 2.84E	2	33	16	-0.3	0.6
147	2020	64	7	N-E	6 58 15.12N	158 11 54.04E	5	0	0	30.4	-7.3
147	2142	62	13	N-W	6 58 52.28N	158 12 6.70E	3	11	2	7.3	5.7
147	2202	64	63	N-E	6 58 47.40N	158 12 15.14E	12	0	0	5.7	77.2
147	2244	65	13	S-E	6 58 47.40N	158 12 2.12E	4	16	8	2.7	0.1
148	128	65	43	S-W	6 58 45.38N	158 12 3.00E	2	23	14	0.7	1.0
148	248	54	49	N-E	6 58 44.34N	158 12 2.22E	2	34	16	-0.4	0.2
148	330	63	73	S-E	6 58 45.36N	158 12 0.60E	2	33	1	0.6	-1.1
148	438	54	13	N-W	6 58 40.32N	158 11 55.14E	2	17	6	-4.7	-2.8
148	520	63	7	S-W	6 58 50.34N	158 11 58.24E	7	6	2	6.2	-3.4
148	720	42	25	S-E	6 58 44.70N	158 12 2.22E	2	26	13	-0.0	0.2
148	804	42	24	S-W	6 58 45.30N	158 12 2.22E	2	28	12	0.6	0.2
148	932	64	45	S-E	6 58 45.54N	158 12 1.20E	2	33	4	0.3	-0.8
148	1306	65	70	N-W	6 58 44.66N	158 12 5.04E	6	35	0	0.1	3.1
148	1418	54	27	S-E	6 58 45.64N	158 12 1.44E	2	30	14	1.1	-0.5
148	1512	63	40	N-E	6 58 40.36N	158 12 1.08E	2	33	16	0.3	0.2
148	1604	64	27	S-W	6 58 45.00N	158 12 1.04E	2	30	14	0.3	-0.1
148	1702	63	13	N-W	6 58 45.62N	158 12 3.12E	2	16	7	1.0	1.2
148	1856	42	14	N-E	6 58 42.78N	158 12 2.44E	2	21	3	-2.0	0.4
148	2042	42	46	N-W	6 58 45.18N	158 12 2.62E	2	29	14	0.4	0.8
148	2114	64	32	N-E	6 58 44.08N	158 12 2.76E	2	30	11	-0.5	0.4
148	2206	64	42	N-W	6 58 42.54N	158 12 0.24E	2	17	4	-2.2	-1.7
149	36	65	61	S-E	6 58 45.66N	158 11 56.38E	2	0	0	1.2	-3.5
149	158	54	14	N-E	6 58 43.06N	158 12 1.08E	2	0	0	-0.9	0.0
149	226	65	7	S-W	6 58 48.18N	158 11 57.64E	6	0	0	3.4	-4.1

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 7B-1

ARITHMETIC MEAN SOLUTION AT PONAPE MAIN DOCK

NP	N	ASD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
39	15	24	6 58 44.74N 158 12 1.97E	0.5 1.2	0.2 0.2

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
147	226	X	X	
147	410		X	
147	1416	X		
147	1506		X	
147	1658	X	X	
147	2020	X	X	X
147	2142	X		
147	2202		X	X
147	2344	X		
148	438	X		
148	520	X	X	
148	1306		X	
148	1702	X		
148	1856	X		
149	226	X	X	

TABLE 7C-1

ARITHMETIC MEAN SOLUTION BY SATELLITE AT PONAPE

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	5	6 58 44.93N 158 12 2.59E	0.4 0.4	0.2 0.2
54	6	6 58 44.65N 158 12 2.25E	0.8 0.9	0.3 0.4
63	4	6 58 44.86N 158 12 2.61E	0.4 0.5	0.2 0.2
64	4	6 58 44.86N 158 12 2.61E	0.4 0.5	0.2 0.2
65	6	6 58 44.65N 158 12 2.25E	0.8 0.9	0.3 0.4

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TABLE 8A-1

R/V KANA KEOKI 1971 POSITIONAL DATA, PALAU, CAROLINE ISLANDS
MOORED AT THE MAIN DOCK ON MALAKAL ISLAND

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
167	400	63	67	S-W	7 19 47.16N	134 27 51.79E	6	0	0	-2.2	24.1
167	422	54	29	N-W	7 19 49.42N	134 27 23.64E	2	26	12	-0.3	0.1
167	740	42	28	S-E	7 19 45.56N	134 27 22.80E	2	20	7	0.2	-0.6
167	826	42	29	S-W	7 19 50.28N	134 27 25.20E	2	29	8	0.2	1.7
167	1010	64	71	S-E	7 19 50.70N	134 27 19.02E	3	31	0	1.4	-3.6
167	1202	64	7	S-W	7 19 36.24N	134 27 22.20E	5	0	0	-13.1	-1.3
167	1350	65	42	N-W	7 19 48.12N	134 27 24.54E	2	35	16	-1.2	1.0
167	1543	63	62	N-E	7 19 48.06N	134 27 21.54E	2	31	1	-0.4	-2.0
167	1730	63	9	N-W	7 19 46.02N	134 27 22.62E	6	11	5	-3.3	-0.7
167	1918	42	14	N-E	7 19 48.24N	134 27 24.14E	2	21	9	-1.1	0.7
167	2102	42	46	N-W	7 19 45.20N	134 27 25.30E	2	31	15	-0.1	1.5
167	2150	64	51	N-E	7 19 48.30N	134 27 22.58E	2	32	11	-1.7	-0.5
168	120	65	74	S-W	7 19 50.34N	134 27 26.04E	2	33	16	0.7	2.5
168	312	63	35	S-E	7 19 49.50N	134 27 23.28E	2	28	9	0.2	-0.2
168	332	54	83	N-W	7 19 48.36N	134 27 22.01E	2	25	0	-1.0	-1.4
168	500	63	22	S-W	7 19 50.58N	134 27 22.88E	2	25	0	1.2	-0.6
168	630	42	72	S-E	7 19 51.50N	134 27 21.04E	4	33	2	2.3	-17.6
168	622	64	26	S-E	7 19 49.56N	134 27 21.22E	2	26	0	0.2	-0.4
168	1110	64	26	S-W	7 19 47.68N	134 27 22.55E	2	29	14	0.6	-0.3
168	1300	65	76	N-E	7 19 49.36N	134 27 19.24E	2	35	16	-1.7	-5.3
168	1450	65	6	N-W	7 19 45.12N	134 27 20.44E	4	0	0	-4.2	-3.0
168	1640	63	31	N-W	7 19 48.36N	134 27 24.56E	2	26	12	-1.0	1.5
168	2006	42	55	N-E	7 19 48.90N	134 27 21.60E	2	33	1	-0.4	-1.4
168	2104	42	18	N-E	7 19 45.22N	134 27 23.20E	2	26	11	-0.1	-0.5
168	2156	42	11	N-W	7 19 43.18N	134 27 24.72E	6	17	7	-1.2	1.2
168	2248	64	40	N-W	7 19 49.50N	134 27 25.20E	2	33	16	0.2	1.7
169	32	65	38	S-E	7 19 40.14N	134 27 22.93E	2	31	15	-0.2	-0.5
169	220	65	16	S-W	7 19 51.24N	134 27 22.56E	2	18	7	1.9	-0.2
169	276	54	34	N-E	7 19 47.70N	134 27 24.14E	2	31	15	-1.6	0.7
169	410	61	61	S-W	7 19 49.38N	134 27 25.38E	2	37	17	0.0	1.7
169	736	42	28	S-E	7 19 45.02N	134 27 23.22E	2	20	8	-0.3	-0.3
169	838	64	8	S-E	7 19 46.58N	134 27 23.88E	3	8	3	-2.7	0.4
169	1020	64	72	S-W	7 19 49.14N	134 27 25.20E	2	35	17	-0.2	1.7
169	1214	65	29	N-E	7 19 48.48N	134 27 23.24E	2	32	14	-0.6	-0.2
169	1400	65	28	N-W	7 19 47.76N	134 27 24.06E	2	29	11	-1.6	0.6
169	1550	63	61	N-W	7 19 47.56N	134 27 24.96E	11	26	2	23.6	301.5
169	1914	42	16	N-E	7 19 48.36N	134 27 23.64E	1	23	11	-1.0	0.1
169	2058	42	41	N-W	7 19 47.44N	134 27 25.08E	2	32	15	0.1	1.6
169	2200	64	76	N-E	7 19 48.66N	134 27 20.10E	2	35	17	-0.7	-3.4
169	2248	65	12	S-E	7 19 50.40N	134 27 25.20E	2	18	8	1.1	1.7
170	122	65	48	S-W	7 19 50.40N	134 27 23.24E	2	32	15	1.1	-0.2
170	152	64	10	N-E	7 19 50.52N	134 27 23.40E	10	10	4	1.2	-0.1
170	120	63	51	S-E	7 19 50.22N	134 27 23.28E	2	29	7	0.5	-0.2
170	508	63	15	S-W	7 19 51.35N	134 27 23.64E	2	22	6	2.0	0.1
170	646	42	7	S-E	7 19 34.20N	134 27 22.74E	2	0	0	-15.1	-0.4

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 8A-1

R/V KANA KEOKI 1971 POSITIONAL DATA, PALAU, CAROLINE ISLANDS
MOORED AT THE MAIN DOCK ON MALAKAL ISLAND

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
170	826	42	65	S-W	7 19 48.42N	134 27 35.04E	2	33	1	-0.9	11.5
170	932	64	42	S-E	7 19 49.32N	134 27 23.10E	2	27	10	-0.0	-0.4
170	1120	64	17	S-W	7 19 45.62N	134 27 22.56E	2	23	0	0.3	-0.3
170	1310	65	74	N-W	7 19 48.60N	134 27 27.18E	2	35	16	-0.7	3.7
170	1502	64	56	S-E	7 19 49.40N	134 27 17.70E	2	16	0	-0.5	-0.6
170	2004	42	60	N-E	7 19 49.72N	134 27 21.00E	5	32	16	-0.4	-1.6
170	2112	64	28	N-E	7 19 49.72N	134 27 23.64E	2	31	15	0.4	0.1
170	2152	42	10	N-W	7 19 51.42N	134 27 26.16E	4	14	4	2.1	2.7
170	2300	64	26	N-W	7 19 49.08N	134 27 24.06E	2	26	11	-0.3	0.1
171	42	65	59	S-E	7 19 50.64N	134 27 22.20E	2	29	13	1.1	-1.7

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

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TABLE 8B-1

ARITHMETIC MEAN SOLUTION AT PALAU

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
55	18	37	7 15 49.34N 134 27 23.49E	1.0 1.7	0.2 0.1

ALL PROBLEM PASSES ARE LISTED BELOW

CAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
167	400		X	X
167	1202	X	X	X
167	1730	X	X	
167	1918	X		
168	332		X	
168	430		X	X
168	1300		X	
168	1450	X		
168	2158	X		
168	2158	X		
169	1550		X	X
169	2200	X		
169	2348	X		
170	152	X	X	
170	646	X		X
170	826			X
170	2004		X	
170	2152	X		

TABLE 8C-1

ARITHMETIC MEAN SOLUTION BY SATELLITE AT PALAU

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	7	7 15 49.24N 134 27 23.86E	0.4 1.4	0.2 0.5
54	3	7 15 49.66N 134 27 23.48E	0.6 1.4	0.3 0.8
63	7	7 15 49.24N 134 27 23.86E	0.6 1.4	0.2 0.5
64	11	7 15 49.05N 134 27 23.10E	0.7 2.2	0.2 0.7
65	9	7 15 48.94N 134 27 23.87E	0.8 1.2	0.3 0.4

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TABLE 9A-1

R/V KANA KEOKI 1971 POSITIONAL DATA, WELLINGTON, NEW ZEALAND
MOORED TO THE EAST SIDE OF 'GLASGOW' WHARF

107

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
241	1214	64	24	N-E	41 16 53.54S	174 46 55.16E	2	27	4	-0.3	1.6
241	1500	64	56	N-W	41 16 53.52S	174 46 56.64E	2	35	17	-0.7	-0.0
241	1554	65	12	S-E	41 16 55.46S	174 46 55.44E	2	18	8	1.4	2.1
241	1718	64	7	N-E	41 16 55.10S	174 47 54.52E	2	5	2	-19.1	11.0
241	1740	65	66	S-E	41 16 52.26S	174 46 23.58E	3	23	1	-1.0	-34.0
241	1842	63	14	S-E	41 16 53.58S	174 47 0.36E	2	20	9	-0.6	2.8
241	1900	64	59	N-E	41 16 54.84S	174 46 58.62E	2	34	14	0.6	1.1
241	2026	63	72	S-W	41 16 52.02S	174 46 34.44E	4	27	1	-2.2	-23.1
241	2048	64	22	N-W	41 16 54.42S	174 46 57.54E	2	24	11	0.2	-0.0
241	2216	63	13	S-W	41 16 53.06S	174 46 54.36E	2	15	9	-1.2	-3.0
241	2338	42	19	S-E	41 16 54.00S	174 46 55.64E	2	23	8	-0.2	2.1
242	116	64	24	S-E	41 16 52.84S	174 46 59.52E	2	30	14	-1.3	2.0
242	202	64	56	S-W	41 16 54.42S	174 46 57.00E	2	33	14	0.2	-0.5
242	450	65	35	N-E	41 16 55.02S	174 46 58.34E	2	31	14	0.8	0.8
242	518	64	7	S-E	41 17 0.72S	174 47 0.84E	5	5	2	15.5	3.1
242	636	65	11	N-W	41 16 54.42S	174 46 57.54E	2	30	15	7.2	-0.1
242	700	64	55	S-E	41 16 52.02S	174 46 57.54E	2	35	16	-1.2	0.3
242	734	63	42	N-E	41 16 54.46S	174 46 58.32E	2	31	13	0.8	0.6
242	848	64	25	S-W	41 16 54.48S	174 46 56.52E	2	30	15	0.3	-1.0
242	922	63	34	N-W	41 16 54.00S	174 46 57.18E	2	31	14	-0.2	-0.4
242	1228	64	10	N-E	41 16 50.32S	174 47 0.18E	2	15	7	4.1	2.0
242	1412	64	68	N-E	41 16 54.10S	174 46 55.82E	2	23	3	0.1	-0.0
242	1600	64	19	N-W	41 16 54.16S	174 46 57.54E	2	26	12	-0.0	-0.2
242	1650	65	18	S-E	41 16 53.10S	174 46 58.32E	2	31	14	-1.1	0.8
242	1810	64	26	N-E	41 16 54.00S	174 46 56.62E	2	26	11	-0.2	1.1
242	1838	65	11	S-W	41 16 53.82S	174 46 57.54E	2	29	14	-0.4	-0.0
242	1936	63	42	S-E	41 16 53.34S	174 46 56.74E	2	24	9	-0.0	1.2
242	1956	64	50	N-W	41 16 54.36S	174 46 56.74E	2	30	11	0.2	-0.8
242	2126	63	30	S-W	41 16 51.70S	174 46 57.18E	2	23	11	-0.5	-0.4
243	1320	42	64	N-W	41 16 54.42S	174 46 56.84E	2	31	1	0.2	-0.7
243	1516	42	0	N-W	41 17 15.00S	174 47 23.34E	2	12	3	20.4	25.4
243	1604	65	17	S-E	41 16 55.46S	174 46 50.24E	2	12	4	5.3	-7.3
243	1720	64	10	N-E	41 16 55.92S	174 46 58.20E	5	15	7	1.7	0.7
243	1750	65	70	S-W	41 16 54.06S	174 46 57.54E	2	31	15	-0.1	0.3
243	1850	63	19	S-E	41 16 55.06S	174 46 55.70E	2	21	1	0.0	2.2
243	1906	64	71	N-E	41 16 54.14S	174 46 57.04E	3	22	0	0.0	-0.5
243	2034	63	68	S-W	41 16 53.52S	174 46 55.64E	2	32	15	-0.7	-1.3
243	2054	64	18	N-W	41 16 52.74S	174 46 55.64E	2	22	11	-1.5	-2.0
243	2334	42	21	S-E	41 16 3.60S	174 46 37.44E	3	13	3	69.4	-80.1
244	118	42	64	S-W	41 16 53.34S	174 46 57.54E	3	26	2	-0.3	-0.0
244	312	64	37	S-W	41 16 53.76S	174 46 57.36E	2	21	0	-0.4	-0.2
244	500	65	40	N-E	41 16 50.46S	174 46 59.38E	2	13	16	0.5	0.8
244	522	64	10	S-E	41 17 0.30S	174 46 47.74E	2	13	3	6.1	-0.8
244	646	65	24	N-W	41 16 54.42S	174 46 57.18E	2	27	13	0.2	-0.4
244	704	64	64	S-E	41 16 53.10S	174 46 58.50E	3	37	17	-1.1	1.0

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 9A-1

R/V KANA KEOKI 1971 POSITIONAL DATA, WELLINGTON, NEW ZEALAND
MOORED TO THE EAST SIDE OF 'GLASGOW' WHARF

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
244	744	63	55	N-E	41 16 54.48S	174 46 56.88E	2	33	1	0.3	-0.7
244	844	64	20	S-W	41 16 54.00S	174 46 55.68E	2	26	13	-0.2	-1.0
244	930	63	26	N-W	41 16 54.06S	174 46 57.54E	2	29	11	-0.1	-0.0
244	1226	42	54	N-E	41 16 54.72S	174 46 57.54E	2	35	14	0.5	-0.0
244	1412	42	25	N-W	41 16 53.88S	174 46 57.72E	2	30	15	-0.3	0.2
244	1430	64	69	N-W	41 16 55.38S	174 46 22.34E	4	15	1	1.2	-35.2
244	1518	65	7	S-E	41 16 44.55S	174 47 6.18E	13	0	0	-7.6	8.6
244	1610	64	14	N-W	41 16 55.26S	174 46 58.08E	2	20	9	1.1	0.5
244	1700	65	53	S-E	41 16 54.00S	174 46 57.18E	2	32	15	-0.2	-0.4
244	1814	64	32	N-E	41 16 54.42S	174 46 57.72E	2	32	15	0.2	0.2
244	1850	65	22	S-E	41 16 55.06S	174 46 57.54E	2	25	12	0.0	-0.0
244	1944	63	53	S-E	41 16 53.64S	174 46 58.38E	2	26	0	-0.6	0.8
244	2004	64	40	N-W	41 16 53.76S	174 46 58.34E	2	26	11	-0.4	0.8

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

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TABLE 9B-1
ARITHMETIC MEAN SOLUTION AT WELLINGTON

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
58	15	43	41 16 54.19S 174 46 57.55E	1.0 1.5	0.2 0.2

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SPCS OF APC
241	1554	X		
241	1718	X		X
241	1740			X
241	1842	X		
241	2026			X
241	2216	X		
242	518	X	X	X
242	1228	X		
243	1508	X		X
243	1720	X	X	
243	2134			X
244	522	X		X
244	1410			X
244	1518	X	X	
244	1610	X		

TABLE 9C-1
ARITHMETIC MEAN SOLUTION BY SATELLITE AT WELLINGTON

SATELLITE NUMBER	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	5	41 16 54.07S 174 46 57.96E	0.5 1.0	0.2 0.5
54	12	41 16 54.21S 174 46 57.62E	0.6 0.9	0.2 0.1
63	9	41 16 54.12S 174 46 57.76E	0.6 0.9	0.2 0.3
64	7	41 16 54.23S 174 46 57.93E	0.5 0.9	0.2 0.3
65	10	41 16 54.11S 174 46 57.85E	0.6 0.9	0.2 0.1

R/V KANA KEOKI 1972 POSITIONAL DATA, CALLAO, PERU
MOORED TO BERTH 9-D (ON THE ' FISHING PIER ')

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TABLE 10A-1

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
15	1752	63	7	N-E	12 3 17.64S	77 9 1.62W	5	0	0	-2.0	2.7
15	2114	42	60	N-W	12 3 22.58S	77 8 57.06W	2	23	1	3.4	-1.9
15	2144	64	72	N-E	12 3 21.30S	77 9 2.82W	2	31	1	1.7	3.0
15	2334	64	7	N-W	12 3 12.66S	77 9 2.40W	2	1	0	-7.0	3.4
16	44	54	7	N-E	12 3 26.58S	77 8 55.14W	6	0	0	7.0	-3.9
16	86	65	41	S-E	12 3 19.80S	77 8 58.44W	2	20	6	0.2	-0.5
16	226	54	84	N-W	12 3 20.40S	77 8 40.62W	2	31	0	0.0	-18.3
16	244	63	64	S-E	12 3 18.60S	77 8 58.14W	2	33	2	-1.0	-0.4
16	416	54	7	N-W	12 3 10.08S	77 9 6.62W	6	0	0	-0.4	7.5
16	534	63	5	S-E	12 3 17.22S	77 8 56.58W	4	14	6	-2.4	0.6
16	650	42	67	S-E	12 3 17.76S	77 9 1.32W	3	32	0	-1.0	2.4
16	628	64	56	S-E	12 3 18.16S	77 8 58.76W	2	35	17	-1.0	-0.1
16	1738	42	7	S-W	12 3 24.00S	77 7 0.30W	4	0	0	4.4	-113.7
16	1116	64	13	S-W	12 3 16.42S	77 8 56.60W	2	20	0	-1.0	0.0
16	1222	65	23	N-E	12 3 19.40S	77 9 0.36W	2	25	11	-0.7	1.4
16	1514	63	45	N-E	12 3 20.64S	77 8 56.70W	7	25	1	1.0	0.7
16	1558	54	10	S-W	12 3 14.60S	77 9 0.60W	2	14	3	-1.0	1.9
17	1612	63	59	N-W	12 3 20.76S	77 8 55.32W	2	22	1	1.1	-7.6
17	2014	64	8	N-E	12 3 6.48S	77 9 3.60W	4	9	4	-13.1	4.1
17	2104	42	62	N-W	12 3 21.30S	77 8 56.22W	2	34	17	1.7	-2.7
17	2154	64	65	N-W	12 3 21.00S	77 8 53.70W	2	34	1	1.4	-5.3
18	48	54	5	N-E	12 3 14.20S	77 8 56.40W	4	12	5	-3.4	0.4
18	102	64	54	S-E	12 3 18.24S	77 8 50.72W	2	11	15	-1.4	0.3
18	232	54	64	N-W	12 3 21.30S	77 8 56.10W	2	33	16	-1.7	-2.0
18	252	65	8	S-W	12 3 33.18S	77 8 56.64W	3	9	4	13.6	-2.0
18	266	63	66	S-W	12 3 18.36S	77 9 11.22W	11	0	0	-1.3	12.3
18	546	63	7	S-W	12 3 12.24S	77 9 6.12W	3	0	0	-7.4	7.2
18	646	42	64	S-E	12 3 16.56S	77 9 30.72W	16	0	0	-3.7	31.8
18	736	54	78	S-E	12 3 18.48S	77 9 3.42W	3	33	0	-1.1	4.5
18	1036	42	7	S-E	12 3 32.16S	77 8 58.44W	2	0	0	12.5	-0.5
18	1128	64	7	S-W	12 3 36.50S	77 8 54.60W	2	0	0	14.0	-4.4
18	1228	65	34	N-E	12 3 20.64S	77 9 0.00W	2	33	16	1.0	1.0
18	1530	63	50	N-E	12 3 21.42S	77 8 57.66W	2	16	4	1.8	-1.0
18	1711	63	15	N-W	12 3 18.96S	77 9 0.00W	2	24	11	-0.7	1.0
18	2112	42	42	N-E	12 3 20.88S	77 8 56.70W	2	31	4	1.3	0.7
18	2156	64	43	N-E	12 3 21.00S	77 9 0.78W	2	20	7	1.4	1.4
18	2200	42	17	N-W	12 3 33.24S	77 9 32.04W	2	21	5	13.6	33.1
18	2256	64	17	N-W	12 3 14.80S	77 8 50.40W	2	13	2	0.2	0.4
19	14	65	21	S-E	12 3 20.22S	77 8 50.34W	2	25	11	0.6	0.4
19	140	64	43	N-E	12 3 19.68S	77 9 0.48W	2	33	15	0.1	1.6
19	200	65	29	S-W	12 3 17.18S	77 8 58.80W	2	29	13	-0.2	-0.1
19	206	63	34	S-E	12 3 14.38S	77 8 54.06W	2	30	10	-5.3	-4.0
19	228	64	16	N-W	12 3 20.04S	77 8 58.90W	2	22	10	1.3	0.0
19	454	63	21	S-W	12 3 17.70S	77 9 0.60W	2	26	12	-1.0	1.6

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 10A-1

R/V KANA KEOKI 1972 POSITIONAL DATA, CALLAO, PERU
MOORED TO BERTH 9-D (ON THE ' FISHING PIER ')

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
19	752	42	26	S-E	12 3 17.20S	77 8 56.62W	2	30	14	-0.4	-2.0
19	850	64	31	S-E	12 3 18.04S	77 8 57.46W	2	32	15	-1.6	-1.3
19	918	42	26	S-E	12 3 17.94S	77 8 58.62W	2	29	14	-1.7	-0.0
19	1016	64	25	S-W	12 3 17.64S	77 8 59.04W	2	30	14	-1.7	0.1
19	1142	65	12	N-E	12 3 19.64S	77 8 50.54W	3	10	0	-1.0	1.0
19	1222	54	30	S-E	12 3 10.50S	77 8 58.02W	2	20	5	-0.1	-0.0
19	1438	63	16	N-E	12 3 18.24S	77 8 55.80W	2	13	3	-1.4	-3.2
19	1508	54	26	S-W	12 3 16.56S	77 9 0.06W	2	27	10	-3.1	1.1
19	1620	63	44	N-W	12 3 20.58S	77 8 57.60W	2	30	5	1.0	-1.4
19	1920	42	12	N-E	12 3 16.06S	77 9 1.20W	2	13	4	-4.6	2.7
19	2022	64	15	N-E	12 3 19.36S	77 9 0.78W	4	14	3	-1.3	1.6
19	2104	42	56	N-W	12 3 21.60S	77 8 56.40W	2	34	16	2.0	-2.6
19	2204	64	47	N-W	12 3 21.60S	77 8 57.24W	2	32	2	2.0	-1.7
20	50	64	14	N-E	12 3 19.92S	77 8 50.88W	2	20	9	0.3	0.0
20	222	63	11	S-E	12 3 24.42S	77 8 50.28W	3	15	7	4.8	0.3
20	236	64	48	N-W	12 3 22.14S	77 8 56.20W	2	32	14	2.6	0.3
20	408	63	61	S-W	12 3 18.74S	77 8 56.58W	2	35	17	-0.3	0.6
20	702	42	7	S-E	12 3 31.06S	77 9 1.56W	4	0	0	13.4	2.6
20	804	64	10	S-E	12 3 10.38S	77 8 57.48W	4	13	1	-0.2	-1.5
20	844	42	68	S-W	12 3 10.02S	77 8 53.88W	3	29	0	-0.6	-5.1
20	946	64	68	S-W	12 3 18.36S	77 8 57.74W	2	36	18	-1.3	-1.2
20	1532	42	7	S-W	12 3 28.62S	77 9 1.62W	15	0	0	0.0	2.7
20	1738	65	51	N-E	12 3 20.82S	77 9 1.62W	2	34	1	1.2	0.0
20	1816	54	63	S-W	12 3 18.20S	77 9 8.24W	2	13	0	-3.5	0.3
20	1830	63	56	N-E	12 3 21.30S	77 9 3.84W	2	24	0	1.7	4.0
20	1720	63	9	N-W	12 3 10.48S	77 8 56.82W	4	9	0	-1.1	0.0
20	2008	42	47	N-E	12 3 20.46S	77 8 56.26W	2	19	5	0.3	-3.7
20	2114	64	63	N-E	12 3 20.46S	77 9 3.60W	2	31	5	0.8	4.0
20	2156	42	15	N-W	12 3 21.80S	77 9 0.24W	2	12	5	2.0	1.3
20	2304	64	10	N-W	12 3 19.24S	77 9 0.00W	4	12	0	-0.4	1.0
21	24	65	33	S-E	12 3 17.14S	77 8 50.40W	2	29	13	-0.5	0.4
21	144	54	58	N-E	12 3 21.66S	77 9 3.60W	2	34	15	2.0	4.6
21	212	65	18	S-W	12 3 12.20S	77 8 59.04W	2	23	11	-0.4	0.1
21	216	63	45	S-E	12 3 18.66S	77 8 57.66W	3	32	16	-1.0	-1.3
21	502	63	14	S-W	12 3 15.72S	77 8 56.40W	2	22	10	-0.2	0.7
21	750	42	31	S-E	12 3 19.00S	77 8 56.50W	2	20	3	-0.7	-0.4
21	834	42	24	S-W	12 3 10.12S	77 8 56.10W	2	23	13	-1.5	0.2
21	1046	64	16	S-W	12 3 10.48S	77 8 50.04W	2	24	11	-1.1	0.1
21	1152	65	19	N-E	12 3 20.40S	77 9 0.00W	2	28	17	0.3	1.1
21	1226	64	40	S-E	12 3 10.20S	77 8 58.30W	2	31	6	-0.3	-0.6
21	1448	63	26	N-E	12 3 19.82S	77 9 0.30W	2	20	6	-0.2	1.3
21	1512	64	19	S-E	12 3 18.78S	77 8 56.40W	2	26	10	-0.8	0.4
21	1630	63	30	N-W	12 3 18.00S	77 8 58.30W	2	20	4	0.2	-0.6
21	1916	42	14	N-E	12 3 19.50S	77 8 56.50W	2	15	6	-0.1	0.6
21	2030	64	23	N-E	12 3 15.44S	77 9 0.72W	2	20	5	-0.2	1.8
21	2100	42	51	N-W	12 3 20.76S	77 8 56.76W	2	32	11	1.1	-2.2
21	2214	64	32	N-W	12 3 20.64S	77 8 57.78W	2	30	7	1.0	-1.2

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 10A-1 (CONT.)

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R/V KANA KEOKI 1972 POSITIONAL DATA, CALLAC, PERU
MOORED TO BERTH 9-D (ON THE 'FISHING PIER')

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CT50	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
* 21	2338	65	10	S-F	12 3 19.24S	77 8 56.14W	2	13	5	-4.4	-2.4
22	52	54	15	N-E	12 3 20.28S	77 8 56.70W	2	25	12	0.7	0.7
22	122	65	55	S-W	12 3 19.60S	77 8 56.23W	2	30	15	-1.0	-0.4
22	228	63	17	S-E	12 3 19.20S	77 8 57.60W	2	25	11	-0.4	-1.4
22	246	54	36	N-W	12 3 21.24S	77 8 57.84W	2	14	1	1.6	-1.1
22	412	63	42	S-W	12 3 19.50S	77 8 56.40W	2	32	11	-0.1	0.4
22	412	64	16	S-E	12 3 19.64S	77 8 57.55W	2	22	0	-0.5	-1.3
22	640	42	70	S-W	12 3 19.14S	77 8 56.82W	3	31	0	-0.5	-0.2
22	756	64	46	S-W	12 3 19.14S	77 8 56.20W	2	34	16	-0.5	-0.4
* 22	1236	64	13	S-E	12 3 20.10S	77 8 57.72W	3	20	8	0.5	-1.2
22	1254	65	75	N-E	12 3 21.06S	77 9 1.62W	3	23	1	1.4	2.7
* 22	1358	63	7	N-E	12 2 55.86S	77 9 6.84W	10	4	2	-23.8	7.9
22	1420	54	56	S-W	12 3 19.14S	77 8 59.64W	2	30	10	-0.5	0.7

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 10B-1

ARITHMETIC MEAN SOLUTION AT CALLAC BERTH 9-D

NP	N	NSD	LATITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
104	34	70	12 3 19.62S	1.5	0.2
			77 8 56.97W	2.3	0.3

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
15	1752	X	X	
15	2334	X		
16	44	X	X	
16	226	X		X
16	416	X	X	
16	534	X		
16	1039	X		X
16	1116	X		
16	1514		X	
16	1558	X		
17	2014	X		X
18	49	X		
18	252	X		X
18	356		X	X
18	546	X	X	X
18	846		X	X
18	836		X	
18	1035	X	X	X
18	1128	X		X
18	2200			X
19	1142	X		
19	1020	X		
20	40	X		
20	222	X		X
20	762	X		
20	804	X		
20	1032	X	X	
20	1720	X	X	
20	2304	X		
21	502	X		
21	1316	X		
21	2338	X		
22	1236	X		
22	1358	X	X	X

TABLE 10C-1

BY SATELLITE ----- ARITHMETIC MEAN SOLUTION AT CALLAC BERTH 9-D

SATELLITE NUMBER	NSD	LATITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	14	12 3 19.68S	1.5	0.4
		77 8 57.94W	2.1	0.6
54	13	12 3 20.04S	1.7	0.5
		77 8 57.88W	2.1	0.6
53	15	12 3 20.26S	1.6	0.4
		77 8 57.82W	2.0	0.5
54	16	12 3 20.04S	1.5	0.4
		77 8 57.92W	2.1	0.5
65	13	12 3 20.04S	1.7	0.5
		77 8 57.88W	2.1	0.5

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P/V KANA KFOKI 1972 POSITIONAL DATA,
WCCRD TO PERTH 4-A

TABLE 10A-2

CALLAC. DECU

DAY	GMT	SAT	ELEV	CECM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
54	706	64	77	S-E	12 2 49.22S	77 8 42.42W	2	30	0	-1.1	-2.5
54	746	42	14	S-W	12 2 49.26S	77 8 44.82W	2	23	10	-1.2	-0.1
54	856	64	7	S-W	12 3 2.89S	77 8 46.20W	3	5	2	-12.5	1.2
54	1010	65	39	N-E	12 2 51.66S	77 8 46.20W	2	36	19	1.3	1.2
54	1150	64	76	S-W	12 2 49.08S	77 8 46.84W	2	33	12	-1.3	-2.1
54	1240	63	26	N-E	12 2 50.74S	77 8 44.76W	2	26	12	-0.4	-7.2
54	1342	64	7	S-W	12 3 17.75S	77 8 45.44W	2	0	0	27.3	4.5
54	1430	63	24	N-W	12 2 52.33S	77 8 46.76W	2	23	10	-0.2	-0.2
54	1724	42	21	N-E	12 2 50.34S	77 8 46.30W	2	27	13	-0.1	0.7
54	1836	64	40	N-E	12 2 51.74S	77 8 45.70W	2	31	1	1.1	0.8
54	1914	42	34	N-W	12 2 51.79S	77 8 44.10W	2	25	10	1.4	-0.0
54	2024	64	18	N-W	12 2 51.72S	77 8 42.54W	2	20	1	1.3	-2.0
54	2154	65	24	S-E	12 2 49.44S	77 8 42.26W	2	25	4	-1.0	-1.7
54	2318	64	56	N-E	12 2 52.02S	77 8 46.20W	2	33	0	1.6	1.2
54	2340	65	29	S-W	12 2 47.58S	77 8 46.86W	2	29	14	-2.9	1.0
55	26	63	22	S-E	12 2 49.14S	77 8 42.14W	2	26	12	-1.3	-1.8
55	104	64	13	N-W	12 2 50.04S	77 8 46.70W	2	12	8	0.5	-0.3
55	208	63	37	S-W	12 2 51.00S	77 8 45.70W	2	26	1	0.5	0.4
55	506	42	14	S-E	12 3 25.66S	77 8 46.64W	2	21	10	35.1	1.5
55	620	44	28	S-E	12 2 45.64S	77 8 41.84W	2	30	14	-0.9	-1.1
55	650	42	52	S-W	12 2 49.20S	77 8 45.00W	2	32	10	-1.2	0.7
55	806	64	26	S-W	12 2 47.76S	77 8 44.44W	2	30	14	-2.7	-3.6
55	924	65	13	N-E	12 2 54.36S	77 8 45.12W	4	22	10	2.9	0.2
55	1100	64	37	S-E	12 2 49.66S	77 8 41.04W	2	11	15	-1.5	-1.7
55	1154	63	18	N-E	12 2 51.64S	77 8 41.64W	4	8	3	-1.4	-1.0
55	1246	64	19	S-W	12 2 49.62S	77 8 45.34W	2	25	11	-0.9	0.3
55	1340	63	69	N-W	12 2 53.39S	77 8 43.00W	2	21	0	3.2	-1.0
55	1746	64	14	N-E	12 2 51.66S	77 8 45.56W	2	21	0	1.5	0.7
55	1816	42	76	N-E	12 2 53.10S	77 8 45.34W	2	33	1	2.7	3.4
55	1934	64	51	N-W	12 2 53.28S	77 8 42.60W	2	32	2	2.9	-2.6
55	2064	42	7	N-W	12 2 49.02S	77 8 42.82W	6	2	1	-1.4	-0.7
55	2226	64	19	N-E	12 2 50.04S	77 8 45.60W	2	23	5	-2.4	0.7
55	2252	65	55	S-W	12 2 46.56S	77 8 43.70W	2	29	1	-3.9	9.7
56	12	64	36	N-W	12 2 51.78S	77 8 42.00W	2	33	15	1.4	-2.1
56	42	65	7	S-W	12 2 50.88S	77 8 50.76W	7	0	0	0.5	14.4
56	120	63	53	S-E	12 2 49.20S	77 8 32.16W	5	23	0	-1.2	-12.4
56	310	63	7	S-W	12 2 46.76S	77 8 47.10W	2	1	0	-5.7	2.1
56	556	42	51	S-E	12 2 47.62S	77 8 44.04W	2	33	10	-2.9	-0.9
56	716	64	73	S-W	12 2 47.16S	77 8 43.34W	2	28	0	-4.3	-1.5
56	742	42	14	S-W	12 2 49.62S	77 8 43.86W	2	21	10	-0.5	-1.1
56	808	64	7	S-W	12 3 12.24S	77 8 52.16W	4	0	0	21.8	8.2
56	1012	64	11	S-E	12 2 49.66S	77 8 43.22W	4	15	7	-0.3	-1.6
56	1028	65	55	N-E	12 2 53.88S	77 8 46.44W	2	20	3	3.5	1.5
56	1154	64	58	S-W	12 2 49.44S	77 8 44.94W	2	34	16	-1.0	-0.9
56	1250	63	12	N-E	12 2 52.18S	77 8 45.60W	2	28	0	2.0	0.7
56	1436	63	16	N-W	12 2 52.56S	77 8 43.20W	2	20	7	2.1	-1.9

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

P/V KANA KFOKI 1972 POSITIONAL DATA,
WCCRD TO PERTH 4-A

TABLE 10A-2

CALLAC. DECU

DAY	GMT	SAT	ELEV	CECM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
56	1722	42	23	N-E	12 2 51.66S	77 8 45.12W	2	29	12	1.5	0.2
56	1846	64	50	N-E	12 2 51.60S	77 8 45.48W	2	27	0	1.2	0.5
56	1952	42	31	N-W	12 2 51.64S	77 8 22.64W	3	27	8	215.5	307.7
56	2034	64	12	N-W	12 2 51.72S	77 8 46.00W	3	11	4	-3.3	0.6
56	2204	65	36	S-E	12 2 49.20S	77 8 41.74W	2	30	1	-1.2	-3.2
56	2320	64	74	N-E	12 2 51.48S	77 8 50.34W	4	22	0	1.1	0.4
56	2350	65	19	S-W	12 2 48.26S	77 8 45.26W	2	24	5	-1.5	0.4
57	32	63	32	S-E	12 2 49.06S	77 8 42.60W	2	31	8	-2.4	-2.1
57	110	64	18	N-W	12 2 49.14S	77 8 43.22W	3	10	4	-1.5	-1.0
57	404	42	15	S-E	12 2 49.70S	77 8 42.06W	2	22	10	0.7	-0.6
57	628	64	42	S-E	12 2 49.04S	77 8 43.34W	2	31	13	-1.1	-1.6
57	648	42	47	S-W	12 2 48.00S	77 8 45.12W	2	29	10	-1.5	0.2
57	816	64	17	S-W	12 2 49.43S	77 8 34.52W	2	24	11	-1.3	-0.4
57	932	65	21	N-E	12 2 53.10S	77 8 44.86W	2	26	14	-2.7	-0.1
57	1164	64	49	S-E	12 2 49.46S	77 8 43.34W	2	32	15	-1.8	-1.6
57	1124	65	40	N-W	12 2 52.74S	77 8 43.34W	2	24	9	2.3	-1.6
57	1202	63	14	N-E	12 2 50.68S	77 8 43.84W	3	21	0	-0.8	-1.1
57	1250	64	16	S-W	12 2 49.62S	77 8 44.02W	2	21	10	-0.8	-0.1
57	1348	63	47	N-W	12 2 51.28S	77 8 42.04W	2	26	6	2.0	-0.7
57	1758	64	22	N-E	12 2 51.00S	77 8 44.34W	2	27	1	0.6	-0.4
57	1816	42	62	N-E	12 2 53.56S	77 8 50.10W	3	23	0	3.2	5.2
57	1944	64	15	N-W	12 2 52.20S	77 8 44.14W	2	20	15	2.4	-0.8
57	2004	42	7	N-W	12 1 49.80S	77 8 13.66W	13	0	0	-0.6	-31.7
57	2118	65	12	S-E	12 2 47.52S	77 8 41.64W	2	18	8	-2.9	-3.2
57	2230	64	26	N-E	12 2 50.56S	77 8 45.72W	2	30	14	0.2	0.8
57	2320	65	55	S-W	12 2 49.00S	77 8 47.16W	2	34	17	-1.5	2.2
57	2348	63	10	S-E	12 2 35.04S	77 8 34.06W	3	13	1	-14.5	-10.7
58	16	64	30	N-W	12 2 50.34S	77 8 43.14W	2	30	14	-0.5	-1.9
58	128	63	51	S-W	12 2 51.72S	77 8 12.04W	4	22	0	21.3	-32.7
58	542	64	14	S-E	12 2 49.12S	77 8 42.66W	2	21	9	-0.3	-2.3
58	660	42	53	S-E	12 2 48.12S	77 8 54.36W	2	11	1	-2.3	0.4
58	726	64	45	S-W	12 2 48.18S	77 8 43.86W	2	34	16	-2.2	-1.1
58	644	65	7	N-E	12 2 53.04S	77 8 41.64W	11	0	0	2.6	-3.6
58	1014	64	16	S-E	12 2 50.44S	77 8 52.50W	2	23	11	2.2	-2.1
58	1032	65	78	N-E	12 2 53.04S	77 8 53.52W	4	11	2	2.6	8.6
58	1156	64	43	S-W	12 2 49.08S	77 8 43.62W	2	31	14	-1.3	-1.0
58	1218	65	8	N-W	12 2 48.60S	77 8 45.18W	2	11	4	-1.8	0.2
58	1258	63	62	N-E	12 2 52.38S	77 8 46.32W	2	28	1	2.0	1.4

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

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TABLE 10B-2

ARITHMETIC MEAN SOLUTION AT CALLAO				BERTH 4-A	
NP	N	ASC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
84	30	54	12 2 50.43S 77 8 44.57W	1.9 2.5	0.3 0.3

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION		ITERATIONS >5	DEVIATION >10 SECS OF ARC
		<15	>75		
54	709		X		
54	856	X			X
54	1150		X		
54	1342	X		X	X
55	174	X			
55	574	X			X
55	974	X			
55	1154	X			
55	1749	X			
55	1816		X		
55	2004	X		X	X
56	42	X		X	X
56	120			X	X
56	310	X			
56	742	X			
56	924	X			X
56	1012	X			
56	1908				X
56	2034	X			
57	110	X			
57	1202	X			
57	1250	X			
57	2004	X		X	X
57	2118	X			X
57	2344	X			X
58	124				X
58	542	X			
58	849	X		X	
58	1032		X	X	
58	1218	X			

TABLE 10C-2

BY SATELLITE ----- ARITHMETIC MEAN SOLUTION AT CALLAO				BERTH 4-A	
SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)	
42	10	12 2 50.14S 77 8 46.01W	1.9 3.6	0.5 1.1	
54	12	12 2 50.16S 77 8 45.79W	1.8 3.3	0.5 1.0	
63	10	12 2 50.14S 77 8 46.01W	1.9 3.6	0.5 1.1	
64	12	12 2 50.19S 77 8 45.79W	1.8 3.3	0.5 1.0	
65	10	12 2 50.14S 77 8 46.01W	1.9 3.6	0.5 1.1	

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TABLE 11A-1
R/V KANA KENKI 1972 POSITIONAL DATA, ANCON, PERU
SWINGING AT ANCHOR, BUT NOT DRAGGING

DAY	GMT	SAT	ELFV	GFCM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
59	2354	53	16		11 44 26.76S	77 10 22.56W	2	0	0	-4.8	3.8
60	20	54	23		11 44 32.88S	77 10 22.85W	2	0	0	1.4	-1.0
60	138	63	48		11 44 33.72S	77 10 28.20W	2	0	0	2.2	3.5
60	550	42	51		11 44 25.52S	77 10 17.40W	2	0	0	-2.0	-7.3
60	736	54	33		11 44 30.78S	77 10 25.56W	2	0	0	-0.7	0.8
60	856	65	10		11 44 34.44S	77 10 26.70W	4	0	0	2.9	2.0
60	1018	54	22		11 44 30.78S	77 10 24.64W	2	0	0	-0.7	-0.1
60	1040	65	70		11 44 36.00S	77 10 24.44W	2	0	0	4.5	-0.3
60	1202	54	32		11 44 31.68S	77 10 26.16W	2	0	0	0.2	1.4
60	1230	65	7		11 44 25.62S	77 10 36.72W	7	0	0	-5.3	12.0
60	1306	63	77		11 45 14.76S	77 19 35.46W	8	0	0	43.2	550.7

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 11E-1
ARITHMETIC MEAN SOLUTION AT ANCON - ANCHORED

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
11	3	6	11 44 31.51S 77 10 24.73W	2.8 3.5	1.0 1.2

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15	>75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
60	856	X			
60	1230	X		X	
60	1306		X	X	X

TABLE 11C-1
BY SATELLITE ----- ARITHMETIC MEAN SOLUTION AT ANCON - ANCHORED

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	1	11 44 29.52S 77 10 17.40W		
54	3	11 44 31.06S 77 10 21.54W	1.7 3.8	1.0 2.2
63	2	11 44 31.20S 77 10 20.13W	2.4 3.9	1.7 2.7
64	1	11 44 29.52S 77 10 17.40W		

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TABLE 12A-1

P/V KANA KECKI 1972 POSITIONAL DATA, TALARA, PERU
SWINGING AT ANCHOR, BUT NOT CRABBING

DAY	GMT	SAT	ELFV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
74	508	64	21	S-E	4 33 41.64S	81 17 16.80W	2	23	7	-2.6	-0.6
* 74	526	62	75	S-E	4 33 40.62S	81 17 16.72W	5	26	10	-3.0	-4.7
* 74	652	64	34	S-W	4 33 41.28S	81 17 16.08W	2	32	16	-3.2	-1.4
* 74	622	65	9	N-E	4 33 51.70S	81 17 20.84W	5	12	5	0.2	0.4
* 74	656	64	7	S-E	4 33 52.98S	81 17 17.84W	9	0	0	8.5	-2.5
* 74	1028	65	62	N-W	4 33 47.82S	81 17 17.64W	2	33	2	3.3	-2.4
* 74	1040	64	76	S-W	4 33 43.68S	81 17 14.76W	2	34	16	-0.5	-5.7
* 74	1222	63	47	N-E	4 33 46.20S	81 17 24.26W	2	27	0	4.7	13.8
* 74	1412	63	7	N-W	4 33 36.54S	81 17 18.24W	2	0	0	-13.5	-2.2
* 74	1642	64	11	N-E	4 33 45.84S	81 17 21.84W	2	13	3	1.3	1.4
* 74	1656	42	41	N-E	4 33 47.34S	81 17 23.04W	2	18	5	2.8	2.6
* 74	1828	64	60	N-W	4 33 46.60S	81 17 19.20W	2	31	14	4.1	-1.2
* 74	2146	65	76	S-E	4 33 45.72S	81 17 30.12W	1	33	0	1.2	9.7
* 74	2212	54	60	N-E	4 33 46.20S	81 17 25.14W	2	35	16	1.7	4.7
* = FIX NOT USED FOR COMPUTATION OF THE MEAN											
* 75	C	64	11	N-W	4 33 40.56S	81 17 20.64W	5	18	8	-3.9	0.2
* 75	148	63	13	S-W	4 33 37.14S	81 17 22.32W	2	19	8	-7.4	1.7
* 75	432	42	24	S-E	4 33 41.76S	81 17 17.52W	2	22	9	-2.7	-2.0
* 75	604	64	72	S-E	4 33 41.76S	81 17 31.38W	11	0	0	-2.7	10.0
* 75	754	64	7	S-W	4 34 3.78S	81 17 16.64W	5	0	0	12.3	-1.0
* 75	618	65	47	N-E	4 33 43.14S	81 17 22.02W	2	33	16	-1.4	1.6
* 75	650	64	35	S-E	4 33 41.70S	81 17 16.92W	2	32	15	-2.8	-0.6
* 75	1106	64	13	N-W	4 33 46.08S	81 17 20.04W	2	15	8	2.5	-0.4
* 75	1134	64	19	S-W	4 33 44.88S	81 17 21.72W	2	16	5	0.4	1.3
* 75	1220	63	24	N-W	4 33 44.94S	81 17 19.74W	2	26	9	0.4	-0.7
* 75	1600	42	11	N-E	4 33 34.02S	81 17 16.68W	2	16	7	-10.5	-3.9

TABLE 12P-1

ARITHMETIC MEAN SOLUTION AT TALARA - ANCHORED, SWINGING

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
25	14	11	4 33 44.51S 81 17 20.44W	2.7 2.3	0.8 0.7

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
74	508	X	X	
74	822	X	X	
74	858	X	X	
74	1040		X	
74	1222			X
74	1412	X		X
74	1642	X		
74	2146		X	
75	0			
75	148	X		
75	604	X	X	X
75	754	X	X	X
75	1106	X		X
75	1600	X		

TABLE 12C-1

BY SATELLITE ---- ARITHMETIC MEAN SOLUTION AT TALARA - ANCHORED, SWINGING

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	2	4 33 44.55S 81 17 20.28W	3.9 3.9	2.8 2.4
54	3	4 33 45.10S 81 17 21.90W	2.9 3.0	1.7 2.3
63	1	4 33 47.34S 81 17 23.04W		
64	3	4 33 45.10S 81 17 21.90W	2.9 2.9	1.7 2.3
65	2	4 33 44.55S 81 17 20.28W	3.9 3.9	2.8 2.4

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TABLE 13A-1
R/V KANA KECKI 1972 POSITIONAL DATA, CUAYAGUIL, ECUADOR
MOORED AT BERTH NUMBER 2, PUERTO MARITIMO

DAY	GMT	SAT	ELEV	CECM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
104	1856	25	31	S-E	2 16 58.265	79 54 20.84W	3	34	16	-1.6	0.5
104	1938	25	36	N-E	2 17 1.145	79 54 21.18W	2	30	15	-2.1	-1.1
104	2042	25	27	N-W	2 16 57.725	79 54 19.04W	2	25	11	-2.1	-1.1
104	2126	25	19	N-W	2 17 0.905	79 54 21.42W	2	23	11	-1.1	-1.1
104	2236	25	64	S-W	2 16 58.685	79 54 17.24W	2	25	0	-1.2	-3.1
*105	152	42	7	S-E	2 17 1.025	79 54 18.00W	3	6	1	1.2	-2.3
105	306	42	27	S-E	2 16 57.485	79 54 19.54W	2	30	14	-2.4	-0.4
105	334	42	69	S-W	2 17 0.365	79 54 17.54W	2	23	1	0.5	-3.1
105	452	42	27	S-W	2 16 59.105	79 54 18.72W	2	25	9	-0.7	-1.6
*105	632	42	33	N-E	2 17 0.445	79 54 20.42W	2	19	8	1.0	0.6
105	714	42	21	S-E	2 16 57.125	79 54 20.44W	2	24	8	-2.7	-0.1
105	818	42	40	N-W	2 17 1.865	79 54 18.36W	2	30	14	2.0	-2.0
105	900	42	33	S-W	2 16 57.185	79 54 20.84W	2	31	15	-2.7	0.5
105	1010	42	58	N-F	2 17 1.345	79 54 27.34W	2	31	0	1.5	7.0
*105	1200	42	6	N-W	2 16 58.865	79 54 20.72W	2	25	7	-4.0	0.4
105	1412	42	18	N-F	2 17 1.805	79 54 21.12W	2	16	2	2.0	2.8
105	1506	42	13	N-E	2 17 1.265	79 54 23.26W	2	25	0	1.4	2.0
105	1626	42	46	N-W	2 17 1.025	79 54 18.30W	2	32	2	2.1	-2.0
*105	1656	42	9	N-W	2 16 45.365	79 54 19.20W	2	12	0	-14.5	-1.1
*105	1810	42	10	S-E	2 17 2.705	79 54 20.64W	4	16	7	2.3	0.2
*105	1850	42	10	N-F	2 17 3.125	79 54 21.06W	3	16	7	0.3	0.7
105	1954	42	70	S-W	2 16 58.745	79 54 18.74W	2	35	1	-1.1	-2.8
105	2032	42	59	N-W	2 17 1.925	79 54 17.92W	2	35	17	-1.1	-2.8
105	2148	42	45	S-E	2 16 58.385	79 54 20.84W	2	13	14	-1.5	0.5
*105	2336	42	14	S-W	2 16 58.685	79 54 20.64W	2	17	3	-1.2	0.3
*106	220	42	7	S-E	2 17 2.765	79 54 17.04W	5	3	0	2.0	-3.3
106	240	42	36	S-E	2 16 57.065	79 54 21.84W	2	24	10	-1.0	1.5
106	426	42	71	S-W	2 16 58.085	79 54 13.58W	2	34	1	0.6	-4.8
106	426	42	19	S-W	2 17 2.105	79 54 20.84W	2	21	8	2.3	0.5
106	728	42	44	N-E	2 17 1.025	79 54 26.04W	2	33	15	2.1	6.6
*106	808	42	77	S-E	2 16 58.505	79 54 25.04W	2	38	0	-1.3	4.7
*106	818	42	7	N-W	2 16 58.725	79 54 21.42W	2	0	0	-1.2	1.1
*106	858	42	7	S-W	2 17 2.705	79 54 22.50W	12	0	0	4.2	2.0
106	1108	42	28	N-W	2 17 1.745	79 54 19.20W	12	20	14	1.0	-1.1
106	1518	42	64	N-E	2 17 1.225	79 54 25.22W	2	35	17	1.0	1.0
106	1558	42	37	N-W	2 16 58.005	79 54 18.00W	2	31	15	-1.3	-1.4
*106	1726	42	9	N-W	2 17 0.605	79 54 21.00W	3	12	5	0.8	3.7
106	1904	42	46	S-E	2 16 59.105	79 54 20.84W	2	34	10	-0.7	0.5
106	1942	42	48	N-E	2 17 0.845	79 54 23.76W	2	33	15	1.0	3.4
106	2054	42	18	S-W	2 16 59.285	79 54 19.04W	2	27	13	-2.4	-2.4
*106	2130	42	14	N-W	2 16 58.245	79 54 22.92W	4	17	1	-5.6	2.6
106	2248	42	43	S-W	2 16 57.785	79 54 19.20W	2	30	4	-2.1	-1.1
*107	148	42	5	S-E	2 17 2.285	79 54 16.34W	3	12	5	2.4	-4.0
107	314	42	40	S-E	2 16 58.565	79 54 19.54W	2	31	15	-1.3	-0.8
107	334	42	44	S-W	2 16 58.265	79 54 19.50W	2	29	0	-1.6	-0.8

* * FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 13A-1
R/V KANA KECKI 1972 POSITIONAL DATA, CUAYAGUIL, ECUADOR
MOORED AT BERTH NUMBER 2, PUERTO MARITIMO

DAY	GMT	SAT	ELEV	CECM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
107	502	42	17	S-W	2 16 59.105	79 54 19.50W	2	19	6	-0.7	-2.8
107	542	42	22	N-E	2 17 1.205	79 54 21.42W	2	24	12	1.4	1.1
107	718	42	28	S-E	2 16 58.085	79 54 20.16W	2	31	15	-1.8	-0.2
107	828	42	26	N-W	2 17 1.565	79 54 19.50W	2	27	12	1.7	1.7
107	806	42	25	S-W	2 16 57.505	79 54 20.44W	2	26	12	-2.2	0.1
*107	1020	42	77	N-W	2 17 0.305	79 54 14.04W	2	36	17	1.1	-6.1
107	1456	42	22	N-F	2 17 1.145	79 54 21.66W	2	29	6	1.5	1.3
107	1736	42	30	N-W	2 17 0.745	79 54 18.74W	2	24	7	0.3	-1.6
107	1818	42	17	S-E	2 16 58.025	79 54 20.10W	2	24	0	-1.0	-0.2
107	1852	42	15	N-E	2 17 1.085	79 54 21.84W	2	23	11	1.2	1.5
107	2004	42	48	S-W	2 16 57.745	79 54 18.36W	2	36	17	-2.1	-2.0
107	2036	42	44	N-W	2 17 0.445	79 54 18.00W	2	29	12	0.6	-2.3
107	2156	42	46	S-E	2 16 58.325	79 54 21.72W	2	32	1	-1.5	1.4
*107	2248	42	8	S-W	2 17 7.965	79 54 19.62W	2	7	1	4.5	-0.7
*108	228	42	13	S-E	2 16 53.745	79 54 19.20W	2	21	10	-0.1	-1.1
108	412	42	48	S-W	2 16 58.325	79 54 19.04W	2	30	1	-1.5	-1.4
*108	630	42	7	S-E	2 17 1.145	79 54 17.34W	7	5	2	1.3	-2.0
*108	734	42	73	N-W	2 17 1.385	79 54 16.60W	2	20	0	1.5	-1.7
108	812	42	73	S-W	2 16 59.345	79 54 18.64W	2	20	5	-0.5	-1.9
108	830	42	30	N-E	2 17 2.045	79 54 21.00W	2	37	1	2.2	1.7
108	1118	42	19	N-W	2 17 1.385	79 54 19.04W	2	24	12	1.5	-0.5
*108	1406	42	7	N-F	2 16 47.045	79 54 20.64W	2	0	0	-12.4	0.3
108	1444	42	65	N-W	2 17 1.365	79 54 26.52W	2	20	0	2.0	6.2
108	1714	42	65	S-E	2 16 59.125	79 54 22.50W	2	34	0	-0.7	2.2
108	1846	42	64	N-E	2 17 1.505	79 54 24.76W	2	33	16	1.7	4.0
*108	2104	42	11	S-W	2 17 2.705	79 54 22.32W	3	12	1	2.0	2.0
108	2136	42	9	N-W	2 16 52.865	79 54 21.44W	2	11	0	-7.0	0.8
108	2256	42	29	S-W	2 16 59.265	79 54 19.74W	2	27	2	-1.6	-2.6
*109	144	42	10	S-E	2 16 55.205	79 54 18.64W	2	15	7	-4.6	-1.8
109	224	42	60	S-E	2 16 57.725	79 54 21.12W	2	34	0	-2.1	7.8
*109	512	42	10	S-W	2 17 3.365	79 54 19.66W	2	10	0	-1.5	-0.6
109	652	42	35	N-E	2 17 1.625	79 54 21.66W	2	20	13	1.8	1.6
109	720	42	48	S-E	2 16 59.265	79 54 20.52W	2	33	15	-0.4	0.2
109	818	42	15	N-W	2 17 1.245	79 54 21.72W	2	17	7	3.4	1.4
109	808	42	19	S-W	2 16 59.485	79 54 19.74W	2	25	7	-0.4	-0.6
109	1028	42	53	N-W	2 17 0.845	79 54 17.14W	2	34	18	1.0	-1.2
*109	1456	42	35	N-E	2 17 7.385	79 54 38.82W	2	14	5	7.5	1.5
109	1646	42	20	N-W	2 17 0.745	79 54 20.04W	2	31	1	-0.3	-0.3
109	1626	42	24	S-E	2 16 59.245	79 54 20.04W	2	31	4	-1.9	-0.3
109	1956	42	21	N-E	2 17 0.065	79 54 22.02W	2	25	3	0.2	1.7
109	2014	42	33	S-W	2 16 59.265	79 54 19.02W	2	33	15	-1.6	-1.3
109	2042	42	33	N-W	2 16 59.705	79 54 18.60W	2	20	11	-0.1	-1.7
*109	2204	42	31	S-W	2 17 1.805	79 54 2.40W	2	31	0	2.0	-1.0
*110	222	42	22	S-F	2 20 12.185	79 51 43.02N	3	22	10	102.3	-157.3
110	420	42	15	S-W	2 16 59.945	79 54 18.32W	3	19	7	0.1	-1.0
*110	606	42	10	N-E	2 17 2.745	79 54 18.54W	2	14	6	3.1	-1.8

* * FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 13A-1 (CONT.)

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R/V KANA KEOKI 1972 POSITIONAL DATA, GUAYAQUIL, ECUADOR
MOORED AT BERTH NUMBER 2, PUERTO MARITIMO

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSD	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
*110	632	54	11	S-E	2 17 1.245	79 54 16.08W	2	18	9	1.4	-1.3
110	748	65	50	N-W	2 17 0.365	79 54 17.54W	2	31	15	0.5	-2.8
110	816	54	56	S-W	2 16 58.265	79 54 18.84W	2	35	17	-1.5	-1.5
110	940	63	57	N-E	2 17 1.205	79 54 23.88W	2	34	2	1.4	3.5
*110	1128	63	12	N-W	2 17 0.305	79 54 20.76W	2	16	0	0.5	0.4
110	1406	42	24	N-E	2 17 1.025	79 54 20.04W	2	27	0	1.2	-0.3
110	1550	42	30	N-W	2 17 0.405	79 54 16.34W	2	31	15	0.8	-2.0
*110	1742	45	7	S-E	2 16 58.145	79 54 17.82W	7	0	0	-1.7	-2.5
*110	1924	65	81	S-W	2 16 55.285	79 54 11.04W	2	30	0	-0.6	-0.3
*110	1950	54	84	N-E	2 17 2.105	79 54 38.10W	3	34	14	2.3	17.8
*110	2140	54	7	N-W	2 16 43.685	79 54 24.42W	6	0	0	-15.9	4.1
110	2304	63	19	S-W	2 16 59.285	79 54 19.86W	2	25	13	-0.6	-0.6
*111	140	42	12	S-E	2 17 8.045	79 54 23.46W	4	17	6	8.2	3.1
111	324	42	52	S-W	2 16 59.343	79 54 16.50W	2	32	0	-0.5	-0.3
111	700	65	54	N-E	2 17 1.085	79 54 23.22W	2	32	16	1.2	2.0
111	724	54	50	S-E	2 16 58.925	79 54 20.28W	2	35	17	-0.9	-0.1
*111	850	65	9	N-W	2 16 55.505	79 54 21.06W	5	13	6	-4.3	0.7
*111	914	54	13	S-W	2 16 59.285	79 54 20.88W	2	21	10	-0.6	0.5
111	1036	63	37	N-W	2 16 59.705	79 54 16.72W	2	33	16	-0.1	-1.6

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 13E-1

ARITHMETIC MEAN SOLUTION AT GUAYAQUIL, BERTH # 2

NP	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
110	37	73	2 16 59.845 79 54 20.35W	1.5 2.4	0.2 0.3

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
105	152	X		
105	632	X		
105	1200	X	X	
105	1656	X		X
105	1810	X		
105	1950	X		
105	2336	X		
106	220	X		
106	802	X	X	
106	918	X		
106	058	X	X	
106	1726	X		
106	2136	X		
107	148	X		
107	1020	X		
107	2346	X		
109	228	X		
109	630	X	X	
109	738	X		X
109	1406	X		X
109	2104	X		
109	2146	X		
109	144	X		
109	512	X		
109	1458	X		X
109	2204	X	X	X
110	232	X		X
110	632	X		
110	1128	X		
110	1742	X	X	
110	1924	X	X	
110	1950	X		X
110	2140	X	X	X
111	140	X		
111	850	X	X	
111	914	X		

TABLE 13C-1

BY SATELLITE ----- ARITHMETIC MEAN SOLUTION AT GUAYAQUIL, BERTH # 2

SATELLITE NUMBER	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	10	2 16 59.975 79 54 19.90W	1.4 1.7	0.4 0.5
54	18	2 16 59.575 79 54 20.27W	1.7 1.7	0.4 0.4
63	13	2 16 59.885 79 54 20.15W	1.5 1.5	0.4 0.4
64	14	2 16 59.695 79 54 20.21W	1.6 1.5	0.4 0.4
65	10	2 16 59.755 79 54 20.35W	1.7 1.7	0.4 0.4

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TABLE 13A-2

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R/V KANA KEOKI 1973 POSITIONAL DATA, GUAYAQUIL, ECUADOR,
PORT SIDE TO BERTH NO. 2, PUERTO MARITIMO, STERN 13 METERS BEYOND END.

DAY	GMT	SAT	ELEV	GCOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
46	1814	64	30	N-E	2 17 1.74S	79 54 20.46W	2	25	4	2.0	-0.0
46	1924	42	71	N-E	2 17 1.32S	79 54 20.46W	3	34	17	1.6	-0.0
46	2000	64	23	N-W	2 17 3.78S	79 54 17.64W	2	25	6	4.0	-2.5
46	2114	42	7	N-W	2 17 2.52S	79 54 24.14W	4	5	2	2.0	1.7
46	2224	54	40	N-E	2 17 1.44S	79 54 23.46W	2	30	1	1.7	3.0
46	2320	65	54	S-E	2 16 57.00S	79 54 22.40W	2	31	15	-1.2	2.3
47	14	54	7	N-W	2 16 56.70S	79 54 26.74W	5	0	0	-1.1	6.1
47	110	65	9	S-W	2 17 2.52S	79 54 16.40W	2	11	4	2.0	-0.7
47	302	63	24	S-W	2 16 59.20S	79 54 17.82W	2	30	14	-1.6	-2.6
47	502	64	10	S-E	2 16 58.60S	79 54 21.42W	2	26	12	-1.0	1.0
47	652	42	41	S-E	2 16 59.16S	79 54 21.64W	2	34	17	-0.6	1.1
47	734	64	18	S-W	2 16 59.44S	79 54 17.64W	2	31	13	-1.3	-2.0
47	846	42	17	S-W	2 16 59.76S	79 54 18.46W	2	22	0	0.0	-2.0
47	1000	54	49	S-E	2 16 59.32S	79 54 22.32W	2	34	15	-1.4	1.0
47	1054	65	36	N-E	2 17 1.56S	79 54 21.36W	2	36	17	1.5	1.0
47	1144	54	13	S-W	2 16 59.28S	79 54 16.42W	2	20	9	-0.5	-1.0
47	1240	65	24	N-W	2 17 0.44S	79 54 20.10W	2	28	12	0.5	-0.4
47	1436	63	43	N-W	2 17 1.14S	79 54 21.42W	2	26	7	1.4	1.0
47	1436	63	43	N-W	2 17 1.14S	79 54 21.42W	2	26	7	1.4	1.0
47	1722	64	9	N-E	2 16 58.02S	79 54 16.38W	2	11	5	-1.7	-1.1
47	1832	42	21	N-E	2 17 1.14S	79 54 20.34W	2	24	5	1.4	-0.1
47	1910	64	65	N-W	2 17 2.04S	79 54 18.40W	2	23	2	2.3	-1.5
47	2018	42	32	N-W	2 17 0.12S	79 54 22.04W	2	30	2	0.4	0.4
47	2134	64	27	N-E	2 17 1.12S	79 54 20.46W	2	30	14	1.6	-0.0
47	2232	63	17	S-E	2 16 59.44S	79 54 21.72W	2	23	10	-1.3	1.3
47	2320	54	25	N-W	2 17 1.20S	79 54 21.00W	2	29	14	2.0	0.5
48	14	65	32	S-W	2 16 57.42S	79 54 17.40W	2	28	13	-2.3	-3.1
48	602	42	11	S-E	2 16 57.72S	79 54 19.40W	2	17	4	-2.0	-1.4
48	212	61	71	S-E	2 17 0.72S	79 54 15.74W	2	30	1	1.0	1.0
48	642	64	70	S-E	2 16 57.42S	79 54 26.60W	2	23	0	-2.1	3.0
48	750	42	56	S-W	2 16 58.84S	79 54 16.34W	2	34	17	-0.3	-4.1
48	834	64	7	S-W	2 17 15.06S	79 54 20.40W	7	0	0	15.3	0.1
48	910	54	14	S-E	2 16 50.52S	79 54 22.62W	2	23	11	-0.2	2.0
48	1002	65	12	N-E	2 17 1.14S	79 54 15.64W	3	21	10	1.4	-4.0
48	1056	54	43	S-W	2 16 57.84S	79 54 18.00W	2	34	15	-1.0	-2.5
48	1100	65	62	N-W	2 17 1.50S	79 54 18.46W	2	35	15	1.7	-1.6
48	1344	63	67	N-E	2 17 0.66S	79 54 22.74W	2	34	16	0.0	-2.3
48	1536	63	8	N-W	2 17 2.82S	79 53 22.62W	2	5	1	3.1	-57.9
48	1622	64	45	N-E	2 17 1.60S	79 54 21.64W	2	34	16	2.0	1.4
48	1922	42	72	N-E	2 17 2.22S	79 54 23.46W	6	0	0	2.5	3.0
48	2010	64	15	N-W	2 17 1.22S	79 54 21.64W	2	14	1	2.2	1.4
48	2110	42	7	N-W	2 16 50.70S	79 54 24.78W	2	1	0	-6.1	4.3
48	2224	54	76	N-W	2 17 1.60S	79 54 18.64W	5	32	0	2.0	-1.0
48	2330	65	84	S-E	2 16 56.70S	79 54 38.10W	2	30	1	-3.1	17.6
49	122	63	42	S-E	2 16 59.40S	79 54 21.24W	2	32	10	-0.4	0.4

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 13A-2

R/V KANA KEOKI 1973 POSITIONAL DATA, GUAYAQUIL, ECUADOR,
PORT SIDE TO BERTH NO. 2, PUERTO MARITIMO, STERN 13 METERS BEYOND END.

DAY	GMT	SAT	ELEV	GCOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
49	210	63	17	S-W	2 16 59.58S	79 54 18.42W	2	20	4	-0.2	-2.0
49	602	64	28	S-E	2 16 57.90S	79 54 21.84W	2	30	14	-1.0	1.4
49	656	42	45	S-E	2 16 59.74S	79 54 20.64W	2	11	6	-1.0	0.4
49	744	64	25	S-W	2 16 59.58S	79 54 18.64W	2	30	14	-0.9	-2.4
49	844	42	15	S-W	2 16 59.46S	79 54 16.80W	2	22	10	-0.7	-0.7
49	1004	54	45	S-E	2 16 59.84S	79 54 20.46W	2	33	0	0.1	-0.0
49	1104	65	43	N-E	2 17 0.12S	79 54 16.66W	2	18	18	0.4	-0.6
49	1152	54	9	S-W	2 20 25.32S	79 54 2.46W	4	11	4	20.45	-18.0
50	224	65	20	S-W	2 17 0.12S	79 54 20.82W	3	24	10	0.4	0.1
50	220	61	49	S-W	2 16 59.76S	79 54 23.84W	2	25	5	0.0	3.4
50	514	64	8	S-E	2 17 13.38S	79 54 21.18W	2	7	2	13.6	0.7
50	602	42	13	S-E	2 17 0.60S	79 54 20.64W	2	20	9	0.8	-0.4
50	656	64	71	S-W	2 16 59.04S	79 54 17.34W	2	35	17	-0.7	-3.1
50	914	64	22	S-E	2 16 57.84S	79 54 17.40W	2	22	4	-1.0	-1.1
50	1016	65	20	N-E	2 17 2.58S	79 54 22.62W	2	27	14	2.2	2.2
50	1054	54	32	S-W	2 16 59.92S	79 54 19.64W	2	32	15	-0.4	-0.6
50	1204	65	43	N-W	2 17 1.86S	79 54 18.72W	2	33	15	-2.1	-1.7
50	1354	63	58	N-W	2 16 47.28S	79 51 53.16W	3	29	0	-12.5	-147.3
50	1832	64	68	N-E	2 17 1.08S	79 54 24.84W	3	35	17	1.3	4.4

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

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TABLE 13B-2

ARITHMETIC MEAN SOLUTION, GUAYAQUIL, NO. 2, STERN 13 METERS EXTENDED.

RF	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
64	15	45	2 16 59.76S 79 54 20.46W	2.1 2.3	0.3 0.3

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
46	2114	X		
46	2224		X	
47	114	X		
47	110	X	X	
47	1143	X		
47	1436			X
47	1728	X		
48	608	X	X	
48	838	X		X
48	1009	X		
48	1536	X		X
48	1922		X	
48	2110	X		
48	2228		X	
48	2330	X	X	X
49	1152	X		X
50	514	X		X
50	602	X		
50	1354			X

TABLE 13C-2

BY SATELLITE, MEAN SOLUTION, GUAYAQUIL, NO. 2, STERN 13 METERS EXTENDED.

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	8	2 16 59.82S 79 54 19.99W	1.0 1.8	0.3 0.7
54	8	2 16 59.82S 79 54 19.99W	1.0 1.8	0.3 0.7
63	7	2 16 59.87S 79 54 20.01W	1.0 2.0	0.4 0.9
64	12	2 16 59.21S 79 54 20.53W	3.0 1.8	0.2 0.5
65	10	2 16 59.82S 79 54 20.27W	1.1 1.8	0.4 0.5

TABLE 13A-3

F/V KANA KECKI 1973 POSITIONAL DATA, GUAYAQUIL, ECLADOR,
PORT SIDE TO CARIBBEAN TUNA, PUERTO MARITIMO.

										DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
DAY	GMT	SAT	ELEV	SECM	LATITUDE	LONGITUDE	IT	CTS	CTSD	LATITUDE	LONGITUDE
50	2022	64	8	N-W	2 17 1.38S	79 54 24.42W	2	6	2	3.3	0.8
50	2050	64	11	N-E	2 16 58.02S	79 54 22.44W	4	15	7	-0.1	-1.2
50	2156	65	7	S-E	2 17 5.00S	79 54 21.12W	4	2	0	7.3	-2.5
50	2232	54	58	N-W	2 16 53.76S	79 54 21.12W	2	34	8	1.5	-2.5
50	2340	65	62	S-W	2 16 57.24S	79 54 21.54W	3	22	16	-0.7	-2.1
51	132	63	61	S-E	2 17 8.44S	79 54 24.42W	2	31	11	10.4	-14.7
51	222	63	11	S-W	2 17 5.16S	79 54 24.42W	7	15	3	7.3	1.3
51	626	64	42	S-E	2 16 57.36S	79 54 22.44W	2	34	17	-0.8	-1.2
51	652	42	50	S-E	2 16 57.00S	79 54 22.44W	2	34	16	-1.1	-1.0
51	756	64	16	S-W	2 16 56.18S	79 54 22.44W	3	20	6	-0.0	-1.0
51	840	42	13	S-W	2 16 55.26S	79 54 21.00W	2	18	6	-2.9	-1.8
51	1008	54	71	S-E	2 16 56.16S	79 54 22.44W	3	32	0	-2.0	4.4
51	1114	65	77	N-E	2 16 58.74S	79 54 32.52W	2	35	1	0.6	8.9
51	1158	54	7	S-W	2 17 17.76S	79 54 24.75W	9	0	0	10.6	1.1
51	1306	65	6	N-W	2 16 38.22S	79 54 19.89W	6	0	0	-10.2	-3.0
51	1500	63	19	N-W	2 17 0.72S	79 54 25.44W	3	13	1	2.4	1.8
51	1744	64	24	N-E	2 16 58.22S	79 54 24.44W	2	28	13	2.4	1.0
51	1826	42	26	N-E	2 16 58.68S	79 54 23.22W	2	27	13	0.6	-0.4
51	1730	64	26	N-W	2 16 58.18S	79 54 23.13W	2	26	7	0.2	-0.6
51	2140	54	48	N-E	2 16 57.16S	79 54 25.74W	2	34	17	1.0	2.1
51	2242	65	43	S-E	2 16 55.22S	79 54 22.44W	2	30	14	-2.8	-2.8
51	2326	54	14	N-W	2 16 37.50S	79 54 33.12W	3	21	9	-20.6	3.5

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

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TABLE 13B-3

119

ARITHMETIC MEAN SOLUTION, GUAYAQUIL, PCRT SIDE TO CARRIBEAN TIUNA.

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
22	10	12	2 16 58.11S 79 54 23.65W	1.6 2.1	0.4 0.4

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
50	2022	X		
50	2050	X		
50	2150	X		
51	1142			X
51	322	X	X	
51	940	X		
51	1114		X	
51	1158	X	X	X
51	1306	X	X	X
51	2328	X		X

TABLE 13C-3

BY SATELLITE, MEAN SOLUTION, GUAYAQUIL, PCRT SIDE TO CARRIBEAN TIUNA.

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	2	2 16 57.84S 79 54 22.92W	1.2 0.4	0.9 0.3
54	3	2 16 58.48S 79 54 22.32W	1.4 1.1	0.9 0.5
63	1	2 16 57.00S 79 54 22.62W		
64	4	2 16 57.90S 79 54 23.85W	1.6 2.2	0.9 1.5
65	2	2 16 57.84S 79 54 22.92W	1.2 0.4	0.9 0.3

TABLE 13A-4

R/V KANA KEOKI 1973 POSITIONAL DATA, GUAYAQUIL, ECLADCP.
PCRT SIDE TO BERTH NO. 6, PUERTO MARITIMO.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC) LATITUDE LONGITUDE
65	1848	54	22	N-W	2 16 43.62S	79 54 43.44W	4	24	8	-0.2 -1.2
65	1846	42	12	N-W	2 16 46.38S	79 54 44.04W	2	18	4	2.5 -0.6
65	2020	54	30	N-E	2 16 43.62S	79 54 44.50W	2	31	15	-0.2 -1.9
65	2202	54	24	N-W	2 16 44.34S	79 54 43.86W	2	28	10	0.5 -0.7

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

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TABLE 13P-4

ARITHMETIC MEAN SOLUTION, GUAYAQUIL, PORT SIDE TO PERTH NO. 4.

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
4	1	3	2 16 43.86S 79 54 44.60W	0.4 1.7	0.2 1.0

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
65	1946	X		

TABLE 13C-4

BY SATELLITE, MEAN SOLUTION, GUAYAQUIL, PORT SIDE TO PERTH NO. 4.

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
54	2	2 16 43.98S 79 54 45.18W	0.5 1.9	0.4 1.3

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TABLE 14A-1

R/V KANA KEOKI 1972 POSITIONAL DATA, PUNTA ARENAS, COSTA RICA
SWINGING AT ANCHOR, BUT NOT DRAGGING

DAY	GMT	SAT	ELEV	GECM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
122	1830	54	27	N-E	9 57 51.16N	84 49 27.64W	3	29	14	0.0	1.3
122	2018	54	26	N-W	9 57 47.98N	84 49 27.90W	2	22	6	-1.3	1.5
122	2204	63	41	S-W	9 57 51.24N	84 49 25.56W	2	32	16	-0.1	-0.4
*123	116	42	13	S-E	9 57 54.12N	84 49 23.77W	2	19	7	2.6	-2.6
123	240	64	52	S-E	9 57 52.12N	84 49 25.04W	2	34	16	1.0	-1.3
123	300	42	50	S-W	9 57 51.54N	84 49 23.64W	2	33	16	0.2	-2.4
*123	428	64	13	S-W	9 57 48.00N	84 49 27.24W	2	19	7	-3.3	0.4
*123	600	54	14	S-E	9 57 52.38N	84 49 26.52W	2	18	3	1.1	2.1
123	618	65	40	N-E	9 57 50.10N	84 49 27.48W	2	32	15	-1.2	1.1
123	744	64	41	S-W	9 57 51.60N	84 49 26.58W	2	35	17	0.3	0.2
*123	804	63	12	N-E	9 57 51.06N	84 49 26.22W	3	17	4	-0.3	-0.2
123	946	63	62	N-W	9 57 51.30N	84 49 26.26W	2	16	13	-0.0	-1.1
*123	1256	42	7	N-E	9 57 56.90N	84 49 25.62W	3	0	0	3.6	-0.4
123	1420	64	35	N-F	9 57 50.04N	84 49 26.58W	2	32	16	-1.3	0.2
*123	1440	42	76	N-W	9 57 50.34N	84 49 10.32W	2	30	1	-1.0	-7.1
123	1608	64	20	N-W	9 57 53.44N	84 49 25.02W	2	23	2	2.3	-1.4
*123	1742	54	7	N-E	9 57 47.40N	84 49 23.70W	3	0	0	-3.9	-2.7
*123	1924	54	77	N-W	9 57 50.70N	84 49 20.10W	2	34	17	-0.6	-6.3
123	2116	63	71	S-E	9 57 51.46N	84 49 26.28W	2	31	13	0.2	2.9

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 14B-1

ARITHMETIC MEAN SOLUTION AT PUNTA ARENAS - ANCHORED

NO	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
19	8	11	9 57 51.33N 84 49 26.39W	1.1 1.6	0.3 0.5

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF APC
123	116	X		
123	328	X		
123	600	X		
123	804	X		
123	1256	X		
123	1440		X	
123	1742	X		
123	1924		X	

TABLE 14C-1

BY SATELLITE ----- ARITHMETIC MEAN SOLUTION AT PUNTA ARENAS - ANCHORED

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	1	9 57 51.54N 84 49 23.94W		
54	3	9 57 50.06N 84 49 26.50W	0.9 2.2	0.5 1.3
63	3	9 57 50.06N 84 49 26.50W	0.9 2.2	0.5 1.3
64	3	9 57 50.06N 84 49 26.50W	0.9 2.2	0.5 1.3

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TABLE 15A-1

R/V KANA KEEKI 1972 POSITIONAL DATA, ACAPULCO, MEXICO
DOCKED AT DOCK

122

DAY	GMT	SAT	ELEV	GECM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
132	1852	54	30	N-E	16 50 52.14N	99 54 15.56W	2	12	2	-1.6	0.1
*132	1926	65	76	S-W	16 50 52.44N	99 53 39.84W	3	31	8	-1.3	-35.0
132	2040	54	24	N-W	16 50 49.56N	99 54 15.06W	2	10	3	-4.2	-2.8
132	2102	63	26	S-E	16 51 0.60N	99 54 26.76W	2	25	5	6.8	10.9
*132	2246	43	24	S-W	16 51 0.18N	99 54 4.74W	2	22	2	6.4	-11.1
*133	242	42	65	S-E	16 50 56.14N	99 54 30.30W	2	29	13	2.5	14.4
*133	326	64	87	S-W	16 50 41.76N	99 50 36.06W	3	30	0	-12.0	-218.7
133	430	42	10	S-W	16 51 5.76N	99 54 10.52W	8	9	3	12.7	-4.0
*133	615	54	15	S-E	16 50 52.62N	99 54 14.64W	5	11	1	-1.1	-1.2
133	712	45	60	N-E	16 50 53.10N	99 54 11.34W	2	11	1	-3.7	-4.5
133	804	54	51	S-W	16 50 54.72N	99 54 13.52W	2	19	1	1.7	-2.4
133	857	63	23	N-E	16 50 52.20N	99 54 17.76W	3	21	7	-1.6	1.0
133	1034	63	37	N-W	16 50 53.64N	99 54 14.64W	2	20	5	-0.1	-1.2
133	1476	42	46	N-E	16 50 53.34N	99 54 17.16W	2	13	0	-0.4	1.3
*133	1512	64	70	N-E	16 50 51.00N	99 54 32.29W	2	32	15	-2.8	22.4
133	1614	42	16	N-W	16 50 52.32N	99 54 10.64W	2	15	4	-1.4	-5.1
*133	1700	64	9	N-W	16 51 1.38N	99 54 10.64W	2	10	3	7.7	-5.2
133	1838	65	41	S-E	16 50 55.26N	99 54 14.22W	2	14	2	1.5	-1.6
133	1946	54	44	N-W	16 50 53.34N	99 54 25.74W	2	12	0	-0.4	9.9
133	2026	65	19	S-W	16 50 57.90N	99 54 7.50W	2	24	12	4.1	-9.4

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 15E-1

ARITHMETIC MEAN SOLUTION AT ACAPULCO - DOCKED

NO	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
20	E	12	16 50 53.76N 99 54 15.85W	3.1 5.6	0.9 1.6

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
132	1926		X	X
132	2246			X
133	242			X
133	326		X	X
133	430	X		X
133	614		X	X
133	1512			X
133	1700	X	X	

TABLE 15C-1

BY SATELLITE ----- ARITHMETIC MEAN SOLUTION AT ACAPULCO - DOCKED

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	2	16 50 52.83N 99 54 13.95W	0.7 4.5	0.5 3.2
54	4	16 50 51.84N 99 54 14.73W	1.6 2.9	0.9 1.4
63	3	16 50 52.60N 99 54 14.62W	0.6 3.4	0.4 2.0
65	3	16 50 52.60N 99 54 14.62W	0.6 3.4	0.4 2.0

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TABLE 15A-2

123

R/V KANA KEOKI 1972 POSITIONAL DATA, ACAPULCO, MEXICO
MOORED AT DOCK, 60 METERS WEST OF POSITION ON DAYS 132 - 133.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
133	2200	63	71	S-W	16 50 54.12N	99 53 43.26W	2	24	1	-0.5	-35.9
134	150	42	20	S-E	16 51 1.38N	99 54 20.82W	2	20	9	5.7	1.7
134	238	64	35	S-E	16 51 1.92N	99 54 23.81W	2	29	14	7.3	4.7
*134	334	42	37	S-W	16 50 58.74N	99 54 5.54W	2	27	1	4.1	-10.2
134	424	64	23	S-W	16 50 57.00N	99 54 11.70W	2	20	14	2.3	-7.5
134	428	65	32	N-E	16 50 53.58N	99 54 17.54W	2	20	4	-1.1	-1.2
134	712	54	58	S-E	16 50 54.18N	99 54 19.80W	2	34	17	-0.5	0.5
134	812	65	27	N-W	16 50 53.10N	99 54 16.50W	2	20	6	-1.6	-2.7
*134	900	54	13	S-W	16 50 51.46N	99 54 14.74W	2	21	10	-1.2	-3.4
134	948	43	48	N-E	16 50 51.06N	99 54 33.02W	5	19	0	-3.4	17.3
*134	1332	42	14	N-E	16 50 49.74N	99 54 16.00W	1	17	6	-4.9	-1.2
134	1470	64	24	N-E	16 50 53.22N	99 54 32.28W	7	12	1	-1.4	13.1
134	1516	42	52	N-W	16 50 52.52N	99 54 17.46W	2	22	1	-1.7	-1.7
134	1610	64	37	N-W	16 50 54.60N	99 54 10.14W	2	28	1	-0.1	-0.1
134	1752	65	15	S-E	16 51 3.18N	99 54 26.68W	2	20	10	8.5	9.5
*136	2054	54	13	N-W	16 51 11.34N	99 54 14.12W	10	8	0	16.7	-5.1
*136	2120	63	50	S-E	16 50 52.86N	99 54 39.56W	2	23	9	1.2	29.9
137	200	64	19	S-E	16 50 50.58N	99 54 26.24W	2	23	11	-4.1	7.2
137	346	64	40	S-W	16 50 54.54N	99 54 16.80W	2	10	0	-0.1	-2.4
137	548	65	18	N-E	16 50 50.94N	99 54 11.64W	2	22	10	-3.7	-7.3
137	626	54	27	S-E	16 50 57.12N	99 54 15.78W	2	27	7	-2.6	-3.4
137	710	65	46	N-W	16 50 52.96N	99 54 10.64W	2	26	0	-1.8	0.5
137	812	54	30	S-W	16 50 54.66N	99 54 15.24W	2	11	0	-0.0	-3.0
137	904	63	47	N-E	16 50 54.04N	99 54 19.14W	2	33	14	-0.5	0.2
137	1054	63	17	N-W	16 50 50.82N	99 54 15.50W	2	20	4	-3.8	-3.3
*137	1346	64	13	N-E	16 50 55.08N	99 54 21.30W	4	20	0	1.3	2.1
137	1816	42	56	N-E	16 50 53.34N	99 54 24.50W	2	34	17	-1.3	5.7
*137	1830	64	55	N-W	16 50 55.50N	99 54 7.00W	2	32	15	0.2	-11.4
*137	1910	54	18	N-E	16 50 56.46N	99 54 33.60W	2	23	7	1.4	14.4
*137	1958	65	40	S-E	16 51 10.48N	99 54 11.76W	14	23	0	20.8	292.4
*138	258	64	76	S-E	16 50 45.84N	99 54 8.24W	1	31	3	-8.8	-10.2
*138	324	42	11	S-W	16 50 58.56N	99 54 5.64W	2	24	7	3.0	-13.5
*138	1630	64	12	N-W	16 50 55.20N	99 54 7.62W	2	16	9	0.5	-11.5
138	1810	65	33	S-E	16 50 57.30N	99 54 25.16W	2	30	14	2.6	10.0
*138	1914	54	60	N-E	16 50 51.84N	99 54 52.14W	2	34	17	-2.0	33.0
138	1954	65	23	S-W	16 50 54.30N	99 54 17.40W	2	13	4	-0.4	-1.4
*138	2128	63	56	S-E	16 50 56.70N	99 54 1.50W	3	17	0	2.0	102.1
139	208	64	29	S-E	16 50 57.06N	99 54 22.86W	2	20	14	2.4	3.7
*139	232	42	55	S-E	16 51 0.42N	99 54 34.44W	3	27	0	5.4	74.3
*139	354	64	28	S-W	16 50 59.16N	99 54 4.08W	2	26	0	4.5	-14.2
139	556	65	28	N-E	16 50 51.06N	99 54 20.22W	2	29	14	-2.7	1.1
139	646	65	65	N-E	16 50 52.46N	99 54 23.40W	4	27	0	-2.0	4.2
*139	720	54	83	S-W	16 50 53.28N	99 53 19.38W	4	32	14	-1.4	-60.4

* = FIX NET USED FOR COMPUTATION OF THE MEAN

TABLE 15A-2

R/V KANA KEOKI 1972 POSITIONAL DATA, ACAPULCO, MEXICO
MOORED AT DOCK, 60 METERS WEST OF POSITION ON DAYS 132 - 133.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
139	816	63	17	N-E	16 50 52.68N	99 54 18.60W	2	0	0	-2.0	-0.6
*139	932	65	11	N-W	16 50 44.28N	99 54 18.34W	3	0	0	-10.4	-0.4
139	1006	63	47	N-W	16 50 54.60N	99 54 14.54W	2	22	6	-0.1	-4.6
139	1228	42	18	N-E	16 50 49.56N	99 54 19.20W	2	15	4	-5.1	0.0

* = FIX NET USED FOR COMPUTATION OF THE MEAN

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TABLE 15B-2

ARITHMETIC MEAN SOLUTION AT ACAPULCO - 60 M WEST

NP	N	ASC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
47	21	26	16 50 54.65N 99 54 19.16W	3.4 4.9	0.7 1.0

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
123	2200			X
124	334			X
124	900	X		X
124	044		X	X
124	1332	X		X
124	1410		X	X
126	2054	X	X	X
126	2120			X
127	1346	X		X
127	1530			X
127	1810			X
127	1844		X	X
128	254		X	X
128	324			X
128	1630	X		X
128	1904			X
128	2124			X
129	232		X	X
129	354			X
129	720		X	X
129	932	X		X

TABLE 15C-2

BY SATELLITE ---- ARITHMETIC MEAN SOLUTION AT ACAPULCO - 60 M WEST

SATELLITE NUMBER	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	4	16 50 54.30N 99 54 20.61W	5.0 3.2	2.5 1.6
54	3	16 50 55.88N 99 54 21.08W	4.8 3.7	2.9 2.1
62	4	16 50 54.30N 99 54 20.61W	5.0 3.2	2.5 1.6
64	6	16 50 54.75N 99 54 19.67W	4.1 3.1	1.7 1.3
65	9	16 50 54.23N 99 54 18.73W	3.5 3.1	1.2 1.0

TABLE 15A-3

P/V KANA KECI 1974 POSITIONAL DATA, ACAPULCO, MEXICO.
MOORED TO MAIN PIER

DAY	GMT	SAT	ELFV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC) LATITUDE LONGITUDE
105	1102	42	2F	N-E	16 50 53.52N	99 54 19.08W	2	27	13	-0.3 1.8
105	1148	54	A1	N-W	16 50 54.66N	99 54 20.22W	3	23	0	0.8 3.0
105	1248	42	27	N-W	16 50 53.22N	99 54 17.46W	2	27	7	-0.6 0.2
105	1548	65	65	S-W	16 50 53.64N	99 54 13.34W	3	11	0	0.1 -3.9
105	1710	63	44	S-E	16 50 53.88N	99 54 16.02W	2	13	1	0.8 -1.2
105	1816	99	53	N-E	16 50 30.78N	99 51 11.88W	3	33	16	-23.1 -155.4

* = FIX ACT USED FOR COMPUTATION OF THE MEAN

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TABLE 15B-3

ARITHMETIC MEAN SOLUTION, ACAPULCC, MAIN PIER

NP	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
6	1	5	16 50 53.24N 99 54 17.23W	0.5 2.7	0.2 1.2

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
195	1816			X

TABLE 15C-3

BY SATELLITE, MEAN SOLUTION, ACAPULCC, MAIN PIER.

SATELLITE NUMBER	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	2	16 50 53.37N 99 54 18.27W	0.2 1.1	0.2 0.8
54	1	16 50 53.52N 99 54 19.02W		
63	1	16 50 53.52N 99 54 19.08W		

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TABLE 16A-1

R/V KANA KROKI 1972 POSITIONAL DATA. SANC ISLAND. MIDWAY
MOORED TO THE MAIN PIER.

DAY	GMT	SAT	ELEV	GFCM	LATITUDE	LONGITUDE	IT	CTS	CTSQ	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
203	222	42	20	S-E	28 12 40.14N	177 21 47.22W	2	0	0	-1.2	-1.2
203	334	64	66	S-E	28 12 51.56N	177 21 48.00W	2	0	0	1.5	-0.4
203	428	42	46	S-W	28 12 49.32N	177 21 47.22W	2	0	0	-1.0	-1.2
*203	518	64	13	S-W	28 12 52.50N	177 21 49.02W	2	0	0	2.1	2.5
*203	604	65	7	N-E	28 13 3.78N	177 21 51.72W	2	0	0	13.4	2.3
203	642	54	23	S-E	28 12 48.60N	177 21 46.80W	2	0	0	-1.8	-1.5
*203	748	65	77	N-E	28 12 49.80N	177 21 50.52W	3	0	0	-0.6	2.1
203	810	54	39	S-W	28 12 49.68N	177 21 48.42W	2	0	0	-0.4	0.0
*203	938	65	8	N-W	28 13 1.98N	177 21 43.08W	3	0	0	11.6	-5.3
203	1022	63	73	N-E	28 12 48.78N	177 21 53.76W	4	0	0	-1.6	-5.4
203	1558	42	55	N-W	28 12 50.40N	177 21 46.86W	2	0	0	0.0	-1.5
203	1710	64	16	N-W	28 12 47.52N	177 21 50.10W	2	0	0	-2.8	1.7
203	1834	54	15	N-E	28 12 49.44N	177 21 46.56W	2	0	0	-0.0	-1.8
203	1904	65	37	S-E	28 12 51.90N	177 21 47.10W	2	0	0	1.5	-1.3
203	2018	54	50	N-W	28 12 50.46N	177 21 46.80W	2	0	0	0.1	-1.6
203	2052	65	26	S-W	28 12 51.48N	177 21 49.44W	2	0	0	1.1	1.0
203	2138	63	39	S-E	28 12 51.78N	177 21 48.12W	2	0	0	1.8	-0.3
203	2324	63	26	S-W	28 12 53.16N	177 21 49.58W	2	0	0	2.8	1.5

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 16B-1

ARITHMETIC MEAN SOLUTION AT MIDWAY

NP	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
18	5	13	28 12 50.37N 177 21 48.40W	1.5 2.0	0.5 0.5

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
203	222		X	
203	518	X		
203	604	X		X
203	748		X	
203	938	X		X

TABLE 16C-1

ARITHMETIC MEAN SOLUTION BY SATELLITE AT MIDWAY

SATELLITE NUMBER	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	2	28 12 41.84N 177 21 47.04W	0.8 0.3	0.5 0.2
54	4	28 12 49.57N 177 21 47.32W	0.9 0.8	0.4 0.4
63	3	28 12 49.44N 177 21 46.96W	0.9 0.2	0.5 0.1
64	2	28 12 49.86N 177 21 47.04W	0.8 0.3	0.5 0.2
65	2	28 12 49.86N 177 21 47.04W	0.8 0.3	0.5 0.2

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TABLE 17A-1

R/V KANA KENKI 1973 POSITIONAL DATA, Papeete, Tahiti,
MCCRED PORT SIDE TO NORTH END OF MAIN WHARF

DAY	GMT	SAT	ELFV	GECH	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
21	104	64	56	N-E	17 32 2.64S	149 34 21.92W	2	31	15	1.1	0.1
21	128	42	50	N-E	17 32 2.40S	149 34 21.42W	2	33	16	0.9	-0.4
21	1248	64	42	S-E	17 32 0.12S	149 34 22.74W	2	34	17	-1.4	0.9
21	1310	42	36	S-E	17 32 1.26S	149 34 21.66W	2	32	15	-0.2	-0.1
21	1436	64	19	S-W	17 31 59.5PS	149 34 20.70W	2	26	12	-1.9	-1.1
21	1456	42	22	S-W	17 32 3.90S	149 34 22.01W	3	24	13	2.4	0.3
21	1622	54	44	S-E	17 32 0.60S	149 34 22.00W	2	34	17	-0.9	0.3

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 17E-1

ARITHMETIC MEAN SOLUTION AT Papeete, MAIN WHARF

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
7	0	7	17 32 1.50S 149 34 21.80W	1.5 0.6	0.4 0.2

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
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TABLE 17C-1

BY SATELLITE --- ARITHMETIC MEAN SOLUTION AT Papeete, MAIN WHARF

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	3	17 32 2.52S 149 34 21.72W	1.3 0.3	0.4 0.2
54	1	17 32 2.40S 149 34 21.42W		
64	3	17 32 2.52S 149 34 21.72W	1.3 0.3	0.4 0.2

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TABLE 17A-2

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R/V KANA KECKI 1973 POSITIONAL DATA, FAPFETE, TAHITI.
MCCRED AT THE FUEL DOCK

DAY	GMT	SAT	ELEV	CECM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
151	1934	65	24	N-W	17 32 14.765	149 34 11.00W	2	26	4	0.5	1.2
151	1118	63	43	N-F	17 32 15.425	149 34 11.10W	2	30	4	1.2	0.4
151	1354	63	20	N-W	17 32 15.185	149 34 5.69W	2	23	4	1.0	-1.7
* 151	1632	64	77	N-F	17 32 20.165	149 34 30.66W	2	30	0	5.0	40.0
151	1756	42	54	N-E	17 32 14.765	149 34 11.10W	2	30	14	0.5	0.4
* 151	1920	64	7	N-W	17 31 57.306	149 34 12.00W	7	0	0	-16.7	2.2
* 151	1854	42	14	N-W	17 32 13.325	149 34 5.48W	2	19	4	-0.3	-1.2
151	1926	54	63	N-F	17 32 14.745	149 34 11.54W	2	33	16	0.7	0.2
151	2034	65	25	S-E	17 32 14.465	149 34 10.56W	2	26	12	0.2	-0.1
* 151	2114	64	11	N-W	17 32 17.225	149 34 6.04W	2	15	5	3.0	-1.6
151	2220	65	27	S-W	17 32 13.905	149 34 5.60W	2	26	4	-0.4	-1.1
151	2302	63	31	S-E	17 32 13.965	149 34 5.36W	2	37	14	-0.2	-1.3
152	48	63	25	S-W	17 32 13.445	149 34 10.14W	2	25	9	-0.8	-2.5
152	416	64	68	S-E	17 32 12.545	149 34 12.42W	2	36	17	-1.7	1.7
152	448	42	36	S-E	17 32 13.265	149 34 10.14W	2	33	16	-1.0	-0.5

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 17E-2

ARITHMETIC MEAN SOLUTION, TAHITI, FUEL DOCK

NP	N	ASC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
15	4	11	17 32 14.225 149 34 10.65W	0.9 1.0	0.3 0.3

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15	>75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
151	1632		X	X	X
151	1820	X		X	X
151	1854	X			
151	2114	X			

TABLE 17C-2

BY SATELLITE, MEAN SOLUTION, TAHITI, MAIN WHARF 7777777

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	2	17 32 14.015 149 34 10.52W	1.1 0.7	0.8 0.5
54	1	17 32 14.765 149 34 11.10W		
63	4	17 32 14.595 149 34 10.98W	0.0 0.6	0.5 0.3
64	1	17 32 14.765 149 34 11.10W		
65	4	17 32 14.595 149 34 10.98W	0.9 0.6	0.5 0.3

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R/V KANA KEOKI 1973 POSITIONAL DATA.
MCCRED PORT SIDE TO SITIO NO. 2.

TABLE 18A-1

ANTOFAGASTA, CHILE

DAY	GMT	SAT	ELEV	GECM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
* 91	218	64	21	S-E	23 39 12.30S	70 24 18.64W	2	24	11	-1.4	-1.6
* 91	400	42	67	S-E	23 39 13.86S	70 24 18.64W	5	20	0	-0.2	-11.6
* 91	548	42	9	S-E	23 39 32.40S	70 24 20.76W	2	11	4	18.7	0.4
91	612	54	43	S-E	23 39 12.66S	70 24 19.06W	2	29	13	-1.0	-2.3
91	722	65	32	N-E	23 39 14.16S	70 24 20.69W	2	28	14	0.6	0.5
91	758	64	15	S-W	23 39 11.82S	70 24 22.32W	2	26	12	-1.9	1.0
91	804	65	26	N-W	23 39 15.18S	70 24 20.66W	2	28	11	1.5	0.1
* 91	1032	63	67	N-E	23 39 15.60S	70 24 20.64W	4	28	0	1.0	0.2
* 91	1218	63	7	N-W	23 39 9.96S	70 24 22.50W	5	4	1	-3.7	2.1
91	1520	42	34	N-F	23 39 13.56S	70 24 21.18W	2	31	14	-0.1	0.8
91	1706	42	25	N-W	23 39 14.04S	70 24 20.88W	2	29	14	0.3	0.5
91	1732	54	22	N-E	23 39 14.70S	70 24 20.40W	2	27	13	1.0	-0.0
91	1910	65	30	S-E	23 39 13.20S	70 24 18.73W	2	33	14	-0.6	-0.0
91	2054	65	35	S-W	23 39 12.46S	70 24 21.65W	2	35	17	-1.0	-1.3
91	2220	63	74	S-E	23 39 12.24S	70 24 19.26W	3	26	1	-1.5	-1.1
* 92	8	63	10	S-W	23 39 9.96S	70 24 23.46W	2	16	7	-3.7	3.1
92	30	42	27	S-E	23 39 13.80S	70 24 18.72W	2	24	11	0.1	-1.7
92	452	42	32	S-E	23 39 12.60S	70 24 21.26W	2	31	14	-1.1	1.0
92	522	64	15	S-E	23 39 12.84S	70 24 19.50W	2	21	12	-0.9	-0.9
* 92	616	65	11	N-E	23 39 11.29S	70 24 18.78W	2	14	7	-2.4	-1.4
92	704	54	53	S-W	23 39 11.10S	70 24 21.64W	2	34	17	-2.6	1.4
92	818	65	46	N-W	23 39 15.24S	70 24 21.12W	2	34	15	1.6	0.7
92	842	63	33	N-E	23 39 13.74S	70 24 20.70W	2	31	14	0.0	0.3
* 92	1008	65	7	N-W	23 39 42.12S	70 24 35.64W	4	0	0	-11.6	15.0
92	1128	63	25	N-E	23 39 15.72S	70 24 20.28W	2	26	11	2.0	-0.1
92	1434	64	35	N-F	23 39 13.84S	70 24 19.64W	2	30	9	0.1	-0.7
92	1612	42	33	N-W	23 39 15.20S	70 24 23.12W	2	35	0	2.2	2.4
92	1622	64	23	N-W	23 39 16.14S	70 24 21.66W	2	28	0	2.4	1.6
* 92	1756	42	7	N-W	23 39 16.44S	70 24 26.16W	3	0	0	2.7	5.8
* 92	1826	65	11	S-E	23 39 10.44S	70 24 17.64W	6	17	8	-3.3	-2.5
92	2006	65	73	S-E	23 39 11.04S	70 24 24.18W	3	30	1	-2.7	3.4
92	2132	63	29	S-E	23 39 13.62S	70 24 17.70W	2	25	8	-0.1	-2.7
* 92	2156	65	8	S-W	23 39 17.88S	70 24 18.62W	2	9	3	4.2	-1.4
92	2318	63	31	S-W	23 39 13.24S	70 24 21.84W	2	24	3	-0.4	1.4
93	226	64	31	S-E	23 39 12.42S	70 24 18.30W	2	25	10	-1.3	-2.1
* 93	356	42	66	S-E	23 39 12.06S	70 24 18.78W	6	0	0	-1.6	-10.6
93	418	64	28	S-W	23 39 12.78S	70 24 21.84W	3	15	1	-0.9	1.4
* 93	546	42	7	S-W	23 39 10.30S	70 24 24.60W	2	6	1	3.1	4.2
93	614	54	57	S-E	23 39 11.52S	70 24 18.05W	2	34	17	-2.2	-2.3
93	730	65	46	N-E	23 39 14.16S	70 24 21.92W	2	33	15	0.6	1.5
* 93	802	54	14	S-W	23 39 11.22S	70 24 19.20W	2	21	0	-2.6	-1.1
* 93	856	63	11	N-F	23 39 14.34S	70 24 20.10W	6	16	7	0.6	-0.3
93	918	65	17	N-W	23 39 14.64S	70 24 21.84W	2	24	11	0.6	1.4
* 93	1030	63	66	N-W	23 39 14.76S	70 24 19.20W	3	33	16	1.1	-1.1
* 93	1210	61	7	N-E	23 39 39.54S	70 24 32.20W	7	0	0	-24.2	11.7
* 93	1316	64	14	N-E	23 39 11.12S	70 24 19.08W	2	14	2	-2.6	-1.3

* = FIX NET USED FOR COMPUTATION OF THE MEAN

TABLE 18A-1

R/V KANA KEOKI 1973 POSITIONAL DATA.
MCCRED PORT SIDE TO SITIO NO. 2.

ANTOFAGASTA, CHILE

DAY	GMT	SAT	ELEV	GECM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
93	1516	42	37	N-E	23 39 14.70S	70 24 21.36W	2	28	3	1.0	1.0
93	1536	64	55	N-W	23 39 15.48S	70 24 21.18W	2	24	0	1.8	0.8
93	1702	42	23	N-W	23 39 15.42S	70 24 20.76W	2	28	13	1.7	0.4
93	1734	54	28	N-E	23 39 15.06S	70 24 21.24W	2	0	0	1.4	0.8
93	1918	65	43	S-E	23 39 15.18S	70 24 13.08W	2	0	0	1.5	-7.3
93	2106	65	25	S-W	23 39 11.94S	70 24 20.82W	2	31	15	-1.8	0.4

* = FIX NET USED FOR COMPUTATION OF THE MEAN

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TABLE 18E-1

ARITHMETIC MEAN SOLUTION, ANTOFAGASTA, SITIC NO. 2.

NP	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
52	15	36	23 39 13.70S 70 24 20.40W	1.4 2.0	0.2 0.3

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
G1	400		X	X
G1	548	X		X
G1	1032		X	
G1	1218	X	X	
G2	5	X		
G2	635	X		
G2	1008	X		X
G2	1758	X		
G2	1828	X	X	
G2	2156	X		
G3	356		X	X
G3	546	X		
G3	802	X	X	
G3	856	X	X	X
G3	1230	X		
G3	1348	X		

TABLE 18C-1

BY SATELLITE, MEAN SOLUTION, ANTOFAGASTA, SITIC NO. 2.

SATELLITE NUMBER	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	7	23 39 14.29S 70 24 21.06W	1.1 1.3	0.4 0.5
54	7	23 39 14.29S 70 24 21.06W	1.1 1.3	0.4 0.5
63	6	23 39 14.10S 70 24 21.11W	1.1 1.4	0.5 0.6
64	6	23 39 14.10S 70 24 21.11W	1.1 1.4	0.5 0.6
65	11	23 39 13.82S 70 24 20.70W	1.3 1.5	0.4 0.4

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TABLE 104-1

R/V KANA KEOKI 1973 POSITIONAL DATA, EASTER ISLAND
SWINGING AT ANCHOR IN COCK BAY, CROSS BEARINGS BY JOHN C. ROSE

DAY	GMT	SAT	ELEV	BECM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
119	1824	54	30	A-E	27 8 31.58S	109 26 21.18W	2	29	14	1.6	2.7
119	1944	65	23	S-F	27 8 27.24S	109 26 17.52W	2	30	14	-3.2	-0.9
119	2014	54	11	A-W	27 8 27.82S	109 26 16.26W	2	19	5	-0.6	-2.2
119	2130	65	44	S-W	27 8 27.74S	109 26 18.24W	2	36	17	-1.7	-0.2
119	2214	63	38	S-F	27 8 31.44S	109 26 17.82W	2	30	9	1.0	-0.6
120	22	63	23	S-W	27 8 31.44S	109 26 18.12W	2	25	12	1.0	-0.3
120	336	64	57	S-F	27 8 32.22S	109 26 18.70W	2	33	10	1.8	0.4
120	414	42	34	S-C	27 8 31.84S	109 26 16.14W	2	30	11	0.4	-2.3
120	524	64	16	S-W	27 8 29.32S	109 26 22.02W	2	22	11	-0.1	3.6
120	554	42	27	S-W	27 8 32.22S	109 26 16.06W	2	21	7	1.3	0.5
120	612	54	25	S-E	27 8 31.08S	109 26 17.58W	2	29	14	0.7	-0.2
120	706	64	7	A-W	27 8 26.70S	109 26 17.46W	5	0	0	-6.7	-1.0
120	758	64	36	S-W	27 8 29.76S	109 26 18.54W	2	34	17	-0.7	0.1
120	850	65	73	A-E	27 8 33.18S	109 26 26.86W	2	30	1	2.8	10.4

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 105-1

ARITHMETIC MEAN SOLUTION, EASTER ISLAND, COCK BAY

NP	A	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
14	2	12	27 8 30.42S 109 26 18.43W	1.6 1.7	0.5 0.5

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ADC
120	706	X	X	
120	850			X

TABLE 106-1

BY SATELLITE, MEAN SOLUTION, EASTER ISLAND, COCK BAY.

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	2	27 8 31.53S 109 26 17.55W	1.0 2.0	0.7 1.4
54	4	27 8 31.21S 109 26 19.13W	1.1 2.4	0.6 1.2
62	2	27 8 31.53S 109 26 17.55W	1.0 2.0	0.7 1.4
64	2	27 8 31.53S 109 26 17.55W	1.0 2.0	0.7 1.4
65	2	27 8 31.53S 109 26 17.55W	1.0 2.0	0.7 1.4

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TABLE 20A-1

K/V KANA KEOKI 1973 POSITIONAL DATA, PITCAIRN ISLAND
SWINGING AT ANCHOR IN BOUNTY BAY, CROSS BEARINGS BY JOHN ROSE.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
143	1720	42	44	N-W	25 3 53.885	130 5 36.480	3	29	14	1.0	0.3
143	1900	54	73	N-W	25 3 52.265	130 5 38.58W	2	30	14	0.2	2.4
143	1956	65	33	S-E	25 3 51.245	130 5 36.24W	2	30	14	-0.8	0.1
143	2142	65	24	S-E	25 3 51.725	130 5 35.82W	2	27	12	-0.3	-0.3
143	2230	73	44	S-E	25 3 51.605	130 5 33.72W	2	31	14	-0.4	-2.4
144	16	63	15	S-W	25 3 51.425	130 5 36.18W	2	24	11	-0.6	0.0

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

TABLE 20B-1

ARITHMETIC MEAN SOLUTION, PITCAIRN, IN BOUNTY BAY.

NP	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
6	0	6	25 3 52.025 130 5 36.17W	1.0 1.6	0.4 0.6

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
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TABLE 20C-1

BY SATELLITE, MEAN SOLUTION, PITCAIRN, IN BOUNTY BAY.

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	1	25 3 53.885 130 5 36.48W		
54	1	25 3 53.885 130 5 36.48W		
63	2	25 3 53.075 130 5 37.53W	1.1 1.5	0.8 1.0
65	2	25 3 53.075 130 5 37.53W	1.1 1.5	0.8 1.0

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R/V KANA KEOKI 1974 POSITIONAL DATA,
 SECURED PORT SIDE TO BERTH NO. 4

 TABLE 21A-1
 VALPARAISO, CHILE

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTSO	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
142	1424	54	25	N-W	33 2 1.725	71 37 37.14W	2	29	14	0.4	0.4
142	2328	42	7	S-E	33 1 55.405	71 37 36.72W	2	0	0	-4.1	-6.2
142	2345	44	35	S-W	33 1 59.585	71 37 37.56W	2	0	0	-0.5	0.4
143	108	42	67	S-E	33 1 55.705	71 37 33.20W	2	0	0	-0.4	-3.4
143	216	44	32	S-W	33 1 59.205	71 37 37.04W	2	11	16	-1.2	1.3
143	258	42	14	S-W	33 2 1.245	71 37 37.14W	2	20	10	0.4	0.4
143	324	45	10	N-E	33 1 58.445	71 37 36.72W	2	14	5	-2.0	0.0
143	512	45	11	N-W	33 2 2.225	71 37 35.70W	3	30	14	2.3	-1.7
143	645	53	19	S-E	33 1 55.425	71 37 36.72W	2	26	12	-0.7	-1.5
143	710	63	46	N-E	33 2 2.145	71 37 37.56W	2	30	0	1.4	10.0
143	834	99	60	S-W	33 1 58.465	71 37 36.72W	2	36	14	-1.5	1.3
143	858	43	12	N-W	33 2 1.265	71 37 37.32W	4	18	4	0.4	0.4
143	920	44	11	N-E	33 2 1.625	71 37 36.00W	2	14	4	1.1	0.2
143	1106	44	45	N-W	33 2 7.325	71 37 37.68W	1	24	0	4.4	61.0
143	1144	54	15	N-E	33 2 0.125	71 37 36.24W	2	23	10	-0.4	-0.5
143	1224	42	25	N-E	33 2 1.265	71 37 36.72W	2	30	14	0.4	0.4
145	2058	59	30	N-W	33 2 2.345	71 37 36.90W	2	25	11	1.9	3.2
145	2124	44	14	S-E	33 1 59.405	71 37 36.50W	2	23	11	-1.7	-2.2
145	2308	44	66	S-W	33 1 58.645	71 37 36.76W	2	36	14	-1.0	2.0
145	2344	54	14	S-E	33 1 59.825	71 37 36.40W	2	26	12	-0.7	-1.3
146	12	42	28	S-E	33 2 0.065	71 37 34.14W	2	20	14	-0.4	-2.4
146	128	54	41	S-W	33 1 59.865	71 37 37.02W	2	36	14	-1.4	1.2
146	156	42	37	S-W	33 1 59.145	71 37 37.00W	2	33	15	-1.1	1.1
146	432	45	54	N-E	33 2 2.525	71 37 36.04W	2	13	16	2.0	1.3
146	620	45	14	N-W	33 2 2.705	71 37 35.48W	2	22	10	2.2	-0.2
146	638	43	41	N-E	33 2 2.885	71 37 47.52W	3	13	1	2.4	10.8
146	656	50	27	S-E	33 1 59.825	71 37 34.92W	2	22	15	-0.7	-1.4
146	818	63	27	N-W	33 2 2.645	71 37 35.48W	2	25	12	2.2	-0.2
146	840	99	40	S-W	33 1 58.625	71 37 37.56W	2	34	9	-1.4	1.1
146	1026	44	59	N-E	33 2 1.685	71 37 35.00W	2	34	17	1.2	2.3
146	1100	54	7	N-E	33 1 45.125	71 37 30.04W	7	0	0	-15.4	-6.5
146	1126	42	10	N-E	33 2 2.705	71 37 35.70W	2	15	5	2.2	-1.7
146	1214	44	18	N-W	33 2 1.685	71 37 36.42W	2	24	12	1.2	-0.3
146	1244	54	44	N-E	33 2 1.625	71 37 36.70W	2	14	16	1.4	2.0
146	1312	42	44	N-W	33 2 2.745	71 37 36.32W	13	24	0	2.3	12.5
146	1432	54	15	N-W	33 2 3.305	71 37 37.20W	2	23	10	2.4	0.2
146	1500	42	11	N-W	33 2 2.105	71 37 37.00W	3	15	7	1.6	1.3
146	1524	45	54	S-F	33 1 58.685	71 37 34.50W	2	32	0	-1.5	-1.7

* = FIX NOT USED FOR COMPUTATION OF THE MEAN

 TABLE 21E-1
 ARITHMETIC MEAN SOLUTION, VALPARAISO, BERTH NO. 4.

NP	N	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
38	13	25	33 2 0.485 71 37 36.72W	1.5 1.6	0.3 0.3

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
142	2328	X		
143	258	X		
143	326	X		
143	512		X	
143	710		X	
143	858	X		
143	920	X		
143	1106			X
146	638			X
146	1100	X		X
146	1126	X		X
146	1312		X	X
146	1500	X		X

 TABLE 21C-1
 BY SATELLITE, MEAN SOLUTION, VALPARAISO, BERTH NO. 4.

SATELLITE NUMBER	NSD	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	4	33 2 0.075 71 37 37.40W	0.4 2.1	0.4 1.1
54	7	33 2 0.175 71 37 36.11W	0.4 1.4	0.1 0.7
63	1	33 1 59.705 71 37 33.32W		
64	5	33 2 0.145 71 37 36.92W	0.6 2.0	0.4 0.9
65	3	33 2 0.345 71 37 34.72W	0.4 1.4	0.5 1.7
99	5	33 2 0.345 71 37 35.42W	0.9 2.0	3.4 0.0

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TABLE 22A-1

R/V KANA KEOKI 1974 POSITIONAL DATA BALBOA, PANAMA
MOORED TO NORTH SIDE OF PIER NO. 2, RODMAN NAVAL BASE, 75 METERS INWARD.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
167	1530	90	48	N-W	8 52 4.80N	79 30 22.02W	2	30	14	-322.1	-240.0
167	2104	64	31	S-E	8 57 6.54N	79 34 23.34W	3	31	15	-0.3	0.4
167	2226	64	7	S-E	8 56 5.22N	79 34 24.24W	4	0	0	-10.4	1.3
167	2252	64	25	S-W	8 57 6.72N	79 34 22.34W	2	28	10	-0.1	-3.5
167	2315	42	22	S-E	8 57 7.14N	79 34 22.84W	2	27	13	-0.3	-0.0
168	10	54	77	S-W	8 57 7.62N	79 34 22.02W	2	33	1	0.8	-0.0
168	104	42	32	S-W	8 57 8.44N	79 34 23.14W	2	31	15	1.6	0.3
168	235	65	25	N-E	8 57 6.78N	79 34 24.78W	2	32	14	-0.1	1.9
168	442	63	13	N-E	8 57 11.40N	79 34 22.50W	2	20	9	4.5	-0.8
168	1432	65	5	S-E	8 57 17.10N	79 34 22.24W	2	12	1	16.2	0.4
168	1616	65	57	S-W	8 57 6.44N	79 34 22.66W	2	32	15	-0.2	-0.0
168	1758	63	71	S-E	8 57 9.16N	79 34 24.12W	2	31	1	1.3	1.2
168	1824	60	33	N-E	8 57 6.30N	79 34 24.72W	2	28	13	-0.5	1.8
168	2010	60	16	N-W	8 57 6.00N	79 34 22.80W	2	20	0	-0.0	-0.0
168	2202	64	68	S-W	8 57 7.80N	79 34 21.50W	2	36	17	0.0	-1.0
168	2228	42	7	S-E	8 56 33.00N	79 34 22.20W	10	0	0	-23.0	-0.7
168	2318	54	36	S-E	8 57 8.16N	79 34 23.82W	2	33	16	1.3	0.9
169	10	42	79	S-E	8 57 8.34N	79 34 26.58W	2	33	15	1.5	3.7
169	106	54	21	S-W	8 57 7.68N	79 34 22.74W	2	28	13	0.4	-0.2
169	158	42	7	S-W	8 57 10.24N	79 34 24.00W	5	0	0	4.4	1.1
169	212	65	7	N-E	8 57 13.50N	79 34 25.32W	7	0	0	6.0	2.4
169	256	65	76	N-W	8 57 7.38N	79 34 25.54W	2	35	0	0.5	-17.0
169	518	63	57	N-E	8 57 8.56N	79 34 22.44W	2	35	17	-2.3	2.8
169	526	63	12	N-W	8 56 57.24N	79 34 24.18W	2	10	4	-0.6	1.3
169	544	64	82	N-E	8 57 5.34N	79 34 22.64W	2	34	17	-1.5	0.7
169	1058	54	22	N-E	8 57 6.36N	79 34 24.24W	2	27	12	-0.5	1.3
169	1146	42	50	N-E	8 57 6.24N	79 34 25.80W	2	30	13	-0.4	2.0
169	1244	44	31	N-W	8 57 6.00N	79 34 22.68W	2	31	15	-0.2	-0.2
169	1334	42	13	N-W	8 57 7.38N	79 34 23.34W	2	19	0	0.5	0.4
169	1528	65	49	S-E	8 57 6.52N	79 34 23.24W	2	32	13	0.1	-0.0
169	1716	65	12	S-W	8 57 5.52N	79 34 23.40W	2	16	7	-1.3	0.5
169	1858	63	24	S-W	8 57 8.28N	79 34 23.54W	2	25	11	1.4	0.7
169	2114	64	45	S-E	8 57 7.50N	79 34 22.56W	2	34	16	0.6	-0.3
169	2228	54	11	S-E	8 57 2.56N	79 34 17.64W	2	17	7	-4.3	-3.2
169	2302	64	16	S-W	8 57 7.38N	79 34 22.56W	2	24	11	0.5	-0.3
169	2320	42	24	S-E	8 57 7.04N	79 34 22.80W	2	18	5	0.2	-0.1
170	14	54	61	S-W	8 57 8.40N	79 34 22.14W	2	31	0	1.5	-0.4
170	100	42	29	S-W	8 57 6.72N	79 34 22.62W	2	30	14	-0.1	-0.1
170	308	65	37	N-E	8 57 5.70N	79 34 25.74W	2	15	13	-1.2	2.8
170	450	63	20	N-E	8 57 5.64N	79 34 24.42W	2	26	12	-1.2	1.5
170	624	62	44	S-E	8 57 8.16N	79 34 23.52W	2	34	16	0.1	0.6
170	610	59	18	S-W	8 57 6.72N	79 34 21.96W	2	26	12	-0.1	-0.0
170	654	64	30	N-E	8 57 7.50N	79 34 24.84W	2	30	15	0.6	1.0
170	1042	64	24	N-W	8 57 7.20N	79 34 22.26W	2	29	14	0.3	-0.4
170	1152	54	68	N-E	8 57 3.04N	79 35 6.50W	8	0	0	-3.8	44.0

* = FIX ACT USED FOR COMPUTATION OF THE MEAN

TABLE 22A-1

R/V KANA KEOKI 1974 POSITIONAL DATA BALBOA, PANAMA
MOORED TO NORTH SIDE OF PIER NO. 2, RODMAN NAVAL BASE, 75 METERS INWARD.

DAY	GMT	SAT	ELEV	GEOM	LATITUDE	LONGITUDE	IT	CTS	CTS0	DEVIATION FROM THE MEAN (IN SECONDS OF ARC)	
										LATITUDE	LONGITUDE
170	1236	42	46	N-W	8 57 6.42N	79 34 20.82W	2	34	16	-0.4	-2.1
170	1440	65	14	S-E	8 57 5.34N	79 34 22.14W	2	20	6	-0.0	0.8
170	1622	63	8	S-E	8 57 6.74N	79 34 21.54W	2	8	1	-0.1	-1.4
170	1758	60	14	N-E	8 57 6.60N	79 34 23.70W	2	23	10	-0.3	0.3
170	1942	62	27	N-W	8 57 5.64N	79 34 22.90W	2	26	5	-1.2	-0.1
170	2026	64	16	S-E	8 57 8.34N	79 34 22.24W	2	22	7	1.5	0.4
170	2212	64	46	S-W	8 57 8.10N	79 34 23.44W	2	28	3	1.2	0.5
170	2322	54	48	S-E	8 57 8.76N	79 34 23.16W	2	31	12	1.0	0.3
171	6	42	72	S-E	8 57 8.46N	79 34 35.24W	3	31	0	1.5	12.4
171	110	54	15	S-W	8 57 9.10N	79 34 22.64W	2	21	8	2.4	-0.5
171	156	42	7	S-W	8 57 3.54N	79 34 26.04W	6	0	0	-3.3	3.1
171	220	65	12	N-E	8 57 3.18N	79 34 24.72W	4	22	10	-3.7	1.8
171	406	65	61	N-W	8 57 5.28N	79 34 16.62W	2	38	18	-1.6	-3.3
171	518	59	6	S-E	8 57 7.02N	79 34 22.52W	3	12	5	0.2	0.6
171	546	63	6	S-E	8 57 4.46N	79 34 35.84W	6	0	0	-7.4	12.5
171	722	60	74	S-W	8 57 3.35N	79 34 21.24W	3	37	18	0.5	-1.7
171	806	64	6	N-E	8 57 3.00N	79 34 22.32W	4	11	4	0.4	-0.6
171	952	64	67	N-W	8 57 5.46N	79 34 15.80W	2	35	17	-1.4	-3.1
171	1102	54	30	N-E	8 57 6.24N	79 34 24.30W	2	31	15	-0.6	1.4
171	1144	42	58	N-E	8 57 7.02N	79 34 20.82W	2	34	16	1.1	-2.1
171	1720	63	42	S-E	8 56 57.12N	79 34 17.88W	2	27	11	-0.7	46.0
171	2122	64	66	S-E	8 57 2.28N	79 34 17.22W	3	36	17	-0.6	-5.7
171	2222	54	16	S-E	8 57 7.50N	79 34 20.76W	2	24	11	0.6	-2.1
172	16	54	46	S-W	8 57 7.74N	79 34 25.04W	2	34	17	0.9	2.2
172	56	42	27	S-W	8 57 6.54N	79 34 22.80W	2	23	14	-0.3	-0.1
172	316	65	55	N-E	8 57 6.54N	79 34 25.84W	2	34	8	-0.3	2.0
172	458	63	29	N-E	8 57 5.28N	79 34 23.80W	2	31	14	-1.6	0.9
172	556	60	28	S-E	8 57 7.86N	79 34 23.72W	2	32	15	1.0	0.3
172	644	63	25	N-W	8 57 4.80N	79 34 22.14W	2	29	14	-2.1	-0.8
172	740	59	29	S-W	8 57 7.44N	79 34 21.04W	2	32	15	0.6	-0.0
172	904	64	44	N-F	8 57 5.28N	79 34 24.00W	2	33	15	-1.5	1.1
172	1014	54	8	N-F	8 57 14.16N	79 34 27.12W	6	8	3	0.3	4.2
172	1050	42	16	N-E	8 57 7.14N	79 34 23.34W	2	19	2	0.3	0.4
172	1152	54	76	N-W	8 57 5.34N	79 34 22.00W	2	34	17	-1.5	-0.0
172	1234	42	42	N-W	8 57 6.24N	79 34 22.42W	2	33	16	-0.6	-1.5
172	1450	65	25	S-E	8 57 7.74N	79 34 22.60W	2	27	12	0.9	-0.1

* = FIX ACT USED FOR COMPUTATION OF THE MEAN

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TABLE 22B-1

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ARITHMETIC MEAN SOLUTION, PANAMA, FODMAN PIER NO. 2, NORTH SIDE.

NP	N	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
81	26	55	8 57 6.86N 79 34 22.90W	1.3 1.6	0.2 0.2

ALL PROBLEM PASSES ARE LISTED BELOW

DAY	GMT	ELEVATION <15 >75	ITERATIONS >5	DEVIATION >10 SECS OF ARC
167	1930			
167	2226	X		X
168	10		X	
168	442	X		
168	1432	X		X
168	1759		X	
168	2228	X	X	X
169	10			
169	150	X	X	
169	212	X	X	
169	356		X	X
169	726	X		
169	944		X	
169	1334	X		
169	1716	X		
169	2228	X		
170	1152		X	X
170	1622	X		
171	6			X
171	156	X	X	
171	220	X		
171	518	X		
171	546		X	X
171	808	X		
171	1720			X
172	1014	X	X	

TABLE 22C-1

BY SATELLITE, MEAN SOLUTION, PANAMA, FODMAN PIER NO. 2, NORTH SIDE.

SATELLITE NUMBER	NSC	LATITUDE LONGITUDE	STANDARD DEVIATION (SECONDS)	STANDARD DEVIATION OF THE MEAN (SECONDS)
42	10	8 57 6.86N 79 34 22.64W	0.7 1.5	0.2 0.5
54	11	8 57 7.10N 79 34 22.75W	0.8 1.4	0.2 0.4
63	5	8 57 7.13N 79 34 23.45W	0.8 1.3	0.4 0.5
64	12	8 57 7.14N 79 34 22.75W	0.8 1.4	0.2 0.4
65	8	8 57 7.06N 79 34 22.71W	0.8 1.6	0.3 0.5
99	9	8 57 7.07N 79 34 22.78W	0.7 1.5	0.2 0.5

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Satellite Determination Position Geodetic Position Reference Latitude Accuracy Longitude Accuracy Pacific Basin		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) As a by-product of the marine scientific program on the oceanographic cruises of the University of Hawaii's research vessels, positions for 34 dock or anchorage sites in and around the Pacific basin were determined using the Magnavox 702(MX 702/hp) Satellite Navigator as a fixed point positioning device. While it is apparent that not all positions were determined to the same accuracy, a significant number represent improvements of 15 seconds or more in the charted positions of islands, ports and harbors in the Pacific		

(cont.)

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20. ABSTRACT (cont.)

basin. Thus this work may prove to be of considerable benefit by establishing a network of well known and well surveyed Doppler determined positions in the Pacific which may serve as geodetic position references. More fundamentally, this study will contribute to the safety of navigation in making land approaches by providing more modern and accurate positional information than can be obtained from charts.